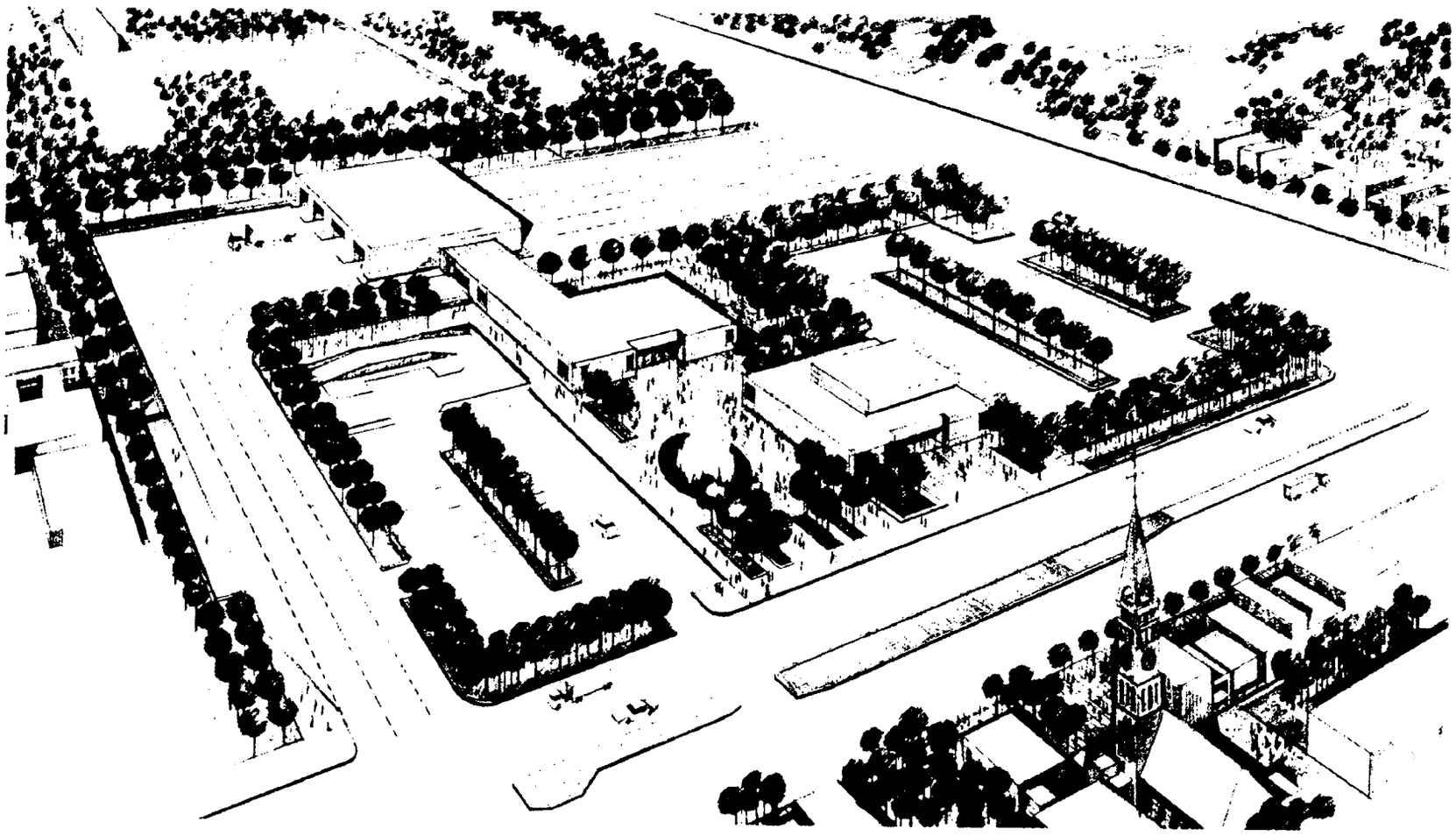
MARYLAND
PERIODIC MOTOR VEHICLE INSPECTION

PREPARED FOR THE TASK FORCE
ON PERIODIC MOTOR VEHICLE
INSPECTION

BY

SYSTEM DESIGN CONCEPTS, INC.
MARCOU, O'LEARY AND ASSOCIATES
SKIDMORE, OWINGS & MERRILL
E. S. PRESTON ASSOCIATES, INC.
WASHINGTON, D. C.
DECEMBER 1971



Dear Governor Mandel:

Pursuant to the provisions of Senate Joint Resolution 56, I am herewith transmitting the final report of the Task Force to develop a Periodic Motor Vehicle Inspection System in Maryland.

The recommendations contained in the report are far-reaching, indeed, and chart a bold and ambitious course for our State. The primary objective of the Task Force was to develop a periodic motor vehicle inspection system free of abuse, capable of gaining the confidence and support of our citizens and designed to improve Maryland's highway safety posture. Simply stated, we want our people to drive safer vehicles, breath cleaner air and have the option of receiving an objective evaluation of their vehicles' performance.

The Task Force is grateful to the Honorable Robert F. Sweeney, Chief Judge of Maryland's District Court, and to members of his staff for their guidance and encouragement; to Secretary of Transportation Harry R. Hughes, and members of his staff, and to Secretary of State Planning Vladimir A. Wahbe and his staff.

The Task Force also is indebted to Systems Design Concepts, Inc., of Washington, D.C., and its President, Lowell Bridwell, consultants to the Task Force and to the National Highway Traffic Safety Administration, U.S. Department of Transportation for the $55,000 grant which made the study possible.

With kindest regards, I am

Sincerely yours,

Ejner J. Johnson
Chairman
PMVI Task Force

TASK FORCE TO DEVELOP A SYSTEM OF PERIODIC MOTOR VEHICLE INSPECTION

Ejner J. Johnson	Administrator, Maryland Motor Vehicle Administration
Frank Altobelli	Chief, Traffic Regulations and Adjudication Division, U.S. Department of Transportation
Henry G. Bosz	Secretary of the Department of Personnel
David H. Fisher	Administrator, Maryland State Highway Administration
Honorable Sol J. Friedman	Member, Maryland House of Delegates
Mr. Stanley R. Kalin	
Honorable R. Clayton Mitchell	Member, Maryland House of Delegates
Colonel Thomas S. Smith	Superintendent, Maryland State Police
Honorable George E. Snyder	Member, Maryland State Senate
Richard H. Turk	Acting director, Division of Transportation Safety, Maryland Department of Transportation
Mr. Jean Schueneman	Chief, Air Quality Control Division, State Department of Health

TABLE OF CONTENTS

SUMMARY

Periodic Motor Vehicle Inspection (PMVI) is one important part of an increasingly comprehensive attack on the deaths, injuries and property damage resulting from accidents.

The 59,000 persons killed in 1970 motor vehicle accidents represented nearly one half of the total victims of all types of accidents.

Research undertaken for the U.S. Department of Transportation resulted in an estimate that 50% of all the motor vehicles on the nation's highways are deficient in one or more important aspects of safety performance.

Although most accident investigation is oriented primarily to determining fault rather than cause, an in-depth research project on a random sample of fatal motor vehicle accidents in California revealed that almost one-third of the vehicles involved had one or more safety defects. Most importantly, in 63% of those accidents, the safety defects either caused or contributed to the accidents or their severity.

Analysis contained in this report shows that motor vehicle accident death rates are lower in those states which have adopted a program of periodic motor vehicle inspection. Similarly, those states which have more than one inspection per year also have substantially fewer traffic deaths.

Highway accidents are products of failures in one or more components of the safety system - the vehicle, the driver, the roadway and the environment in which the components interact. There is no irrefutable evidence that periodic motor vehicle inspection will automatically result in fewer deaths, injuries and accidents, but the evidence strongly suggests that properly equipped and maintained vehicles are important factors in highway safety.

The Federal government recognized the importance of the vehicle in the safety system in 1966 when Congress enacted a comprehensive Highway Safety Program. It has resulted in the promulgation of numerous regulations requiring motor vehicle manufacturers to meet specific safety performance standards. It has resulted in the recall of literally millions of vehicles for repairs of safety related parts or components. Additional safety performance standards are adopted periodically.

Congress also recognized that there must be a method of insuring continued viability of the safe performance of the parts, components or sub-systems manufacturers are required to build into vehicles. Thus, it established as one part of the comprehensive safety program a requirement that states provide a systematic and periodic motor vehicle inspection program for all vehicles operated on the nation's highways. The vehicle inspection requirement is one of 16 standards which must be met by the states.

The Congress indicated the importance it placed on the highway safety program by providing that any state not meeting the 16 standards would be subject to a penalty of 10% of all Federal-aid highway funds apportioned to the states. Such a penalty would amount to about $15 million to Maryland.

Maryland presently does not comply with the periodic motor vehicle inspection standard and falls short of desired conformance with four other standards. While the Federal government has not yet assessed the 10% penalty against any state, it has stated that all states must show significant progress towards meeting all of the 16 standards in order to escape imposition of the penalty.

Maryland's present motor vehicle inspection requirements apply to only 15% of the State's registered motor vehicles. The State is expected to experience a motor vehicle registration growth of almost 45% during the next 10 years. The projected 2.7 million vehicles will require additional facilities and manpower merely to maintain the same level of inspection which is now required. Moreover, if the State is required, as anticipated, to re-examine drivers, the entire State Motor Vehicle Administration program will have to be expanded. This mandate alone suggests the advisability of examining the opportunities open to coordinated development of facilities for several motor vehicle services.

There are two general approaches to PMVI which a state may consider. The first program approach consists of utilizing private garages as inspection centers licensed by the state. Each private garage is initially investigated by the administering agency of the state and licensed to operate within specified standards. The garage that does the inspection almost always does the repair. State supervision costs are covered by the sale of inspection stickers and official inspection signs to the private garages. Since 1926, twenty-nine states have adopted such a "State Licensed inspection" system.

The second approach to PMVI is for the State to assume the full responsibility for owning and operating a State inspection system. This approach permits the inspection system to adopt an assembly-line operation. Using specialized equipment, state inspectors perform repetitive inspections, usually requiring only a matter of minutes. Though this system requires a higher initial capital cost, the quality of inspection is higher and is performed more uniformly. A strong advantage of the state operated inspection system is the unbiased evaluation which the motorist receives. Presently, New Jersey, Delaware and the District of Columbia operate similar programs which are easily adapted to states which have a relatively dense population within a small geographical area. Mobile units offer another alternative for state operated inspection, particularly in low population density areas. The mobile unit is a self-contained inspection lane in a large van; it requires five operators. The capital cost is low but the mobile units have operational problems, particularly during periods of unfavorable weather.

An important potential of the traditional PMVI system is the opportunity to provide a significant consumer protection service by offering to the public diagnostic testing of their vehicles. The concept of diagnostic inspection is simply an organized method of testing, checking, and analyzing every safety and performance factor by use of the most sophisticated equipment available. The emphasis is placed upon testing the vehicle under "realistic" conditions utilizing dynamic equipment whenever possible in lieu of the traditional static testing equipment. Moreover, the diagnostic test goes beyond the minimum safety inspection requirements and further evaluates the performance of the vehicle as a consumer protection service. Legislation presently is being enacted by Congress to provide substantial grants to states offering such service.

The control of automobile exhaust emissions may soon be prescribed by Federal standards and subsequently necessitate an emission testing program in the State. Although several states have been conducting their own testing programs over the past few years, the Federal government has not adopted an optimum program for automobile emission testing. The Federal Environmental Protection Agency has been conducting its own studies to develop a program which it can recommend to the states. The development of the inspection system models for this study made time and space allocations for the potential installation of an emission testing program.

The implementation of PMVI in the State of Maryland would be enhanced by considering the consolidation of several motor vehicle services and related State functions in one State Regional "multi-use" Center. This regional concept offers the benefits of convenience to the public, coordinated efficient motor vehicle services, and overall lower program operating and implementation costs. The Motor Vehicle Administration, the PMVI system, and the newly organized District Courts have been considered as potential participants in the State Regional Centers.

The development of model systems followed agreement upon basic assumptions by the Task Force on Periodic Motor Vehicle Inspection. The Task Force recommends that the inspection system should be State owned and operated and should be coordinated with other related State service functions in regional centers. Further, the inspection system should include a diagnostic service area for consumer protection of the motorist.

The PMVI system the Task Force recommends for Maryland consists of nineteen permanent centers--twelve centers operating 60-hours per week and seven operating 40-hours per week.

The recommended system was evaluated to determine the cost of implementation. The capital costs of land acquisition and buildings for nineteen inspection facilities would be approximately $14.5 million, resulting in annual operating costs for the program of $7.4 million. (Annual operating costs include salaries for six hundred-twenty employees, capital recovery costs, and equipment amortization costs--including overhead.)

The implementation of the nineteen State Regional Centers which include PMVI, Motor Vehicle Administration and District Courts would cost approximately $33 million. (This includes eighty-seven inspection lanes, and eighteen Motor Vehicle Administration branch offices, and eighteen court facilities totaling forty-two courtrooms.) The District Courts and the Motor Vehicle Administration should be assessed an annual leasing charge to cover their capital requirements. The diagnostic service provided by the State would have a fee to cover the operating and capital costs. This is preliminarily estimated at $13.50 assuming a diagnostic test is performed every hour at each center.

A significant beneficial impact of the proposed PMVI system will be the creation of new jobs. Considering direct and indirect employment, the implementation of a PMVI system alone would create more than 1,200 new jobs. If the Motor Vehicle Administration were included, the number of jobs would approach 2,500. These new jobs afford positions which can be filled through training of unemployed people, possibly creating the opportunity for Federal training assistance. Moreover, the economic impact is healthy for the motor vehicle service industry; it would more equitably distribute auto-repair dollars throughout the State.

Finally, the implementation of a PMVI system or the full State Regional Center network could be accomplished in approximately eighteen months from the time of final approval, assuming construction would be undertaken by several contractors. A phase-in plan would be advisable to ease the burden in the initial years of operation.

The PMVI proposal detailed in this report offers an opportunity for Maryland to implement an efficient, effective and beneficial motor vehicle safety inspection program which will bring the State into full conformity with several Federal requirements. But more important, it affords the public a safer environment and an important consumer protection service.

INTRODUCTION

Death and injury from motor vehicle accidents are the cause of almost half of the more than 100,000 yearly deaths from all accidents. A grave fact that cannot be ignored.[1]

It is becoming more and more evident that vehicles are in less than perfect mechanical and physical condition when they come off the assembly line, or after a period of normal usage resulting in gradual wear, deterioration, and maladjustment. The Department of Transportation reported to Congress that an estimated 50% of the 94 million motor vehicles on the road today "are estimated to be deficient in critical aspects of safety performance."[2]

The Highway Safety Act of 1966 grew out of a national recognition of this problem and a Congressional concern for the safe condition of our motor vehicles operating on public thoroughfares. Its purpose focused upon reducing the number of vehicles which have existing or potential unsafe conditions that contribute to many of these accidents or increase the severity of accidents which do occur. Its Highway Safety Program Standard 4.4 states that the purpose for motor vehicle inspection is:

> "To increase through periodic vehicle inspection, the likelihood that every vehicle operated on the public highways is properly equipped and is being maintained in reasonably safe working order."

Stated in its simplest terms, this is the principal benefit of periodic motor vehicle inspection. However, in addition to the primary objective, there are still other benefits to the individual motorist and the public.

An important service to the motorist is an "early warning" of vehicles on the borderline of safety. For instance, a motorist who barely rates his "approved" sticker and is advised that his brakes meet only minimum safety requirements is alerted to the need for brake attention soon, if not immediately. Injury to a hydraulic brake hose can be spotted in time for replacement before possible disaster.

Another benefit to the motorist is an increased awareness of the necessity for keeping his car in safe driving condition at all times, and the folly of assuming it is. One trip to the inspection center is worth a thousand words. First, it directly involves the motorist in an overt act of safety. What he learns about his car and its safe driving condition when he watches the inspection being performed is a lesson from real life. He is doing something for traffic safety which may someday save the life of members of his family or ours.

Further, there are accountable economic benefits. First, lower repair bills are the result of correcting mechanical troubles before they erupt into major repair jobs. This "preventive maintenance" is an important service that may pay for itself more than once. Second, vehicles retain higher resale value when maintained at the level necessary to pass a thorough annual periodic inspection.

Finally, a periodic inspection program benefits the State by providing a verification of credentials for ownership, registration, and licensing. In a similar manner, accurate data can be collected for safety condition and mileage to aid in accident prevention planning. In the end, an inspection program will prevent the State from becoming a dumping ground for vehicles which cannot pass an inspection in neighboring states.

Relationships between Accidents and Vehicle Condition

The theory that MVI contributes to safer vehicles and therefore reduces accidents and death rates has received a great deal of attention and study. Many researchers refuse to say that there is a direct correlation between MVI and death rates on the basis that the data is non-comparable and unrelated. Mayer and Hoult, in their article on MVI,[3] say it is not meaningful to compare the motor vehicle death and accident rates of the various states because there are so many important social and technological variables. The total U.S. highway death rate and the death rate for those states which have not invested in MVI systems must be considered when analyzing the reduced rates for inspection states. Therefore, the attached tables (see Figures 1.1, 1.2 and 1.3), relating number of deaths and vehicle rates according to inspection

1. "59,000 Killed Traveling In U.S. Last Year," The Sun, May 14, 1971, page A4.

2. "Safety in Motor Vehicles in Use," Department of Transportation, June, 1968.

3. Mayer and Hoult, MVI: A Report on Current Information, Measurement, and Research, Institute for Regional and Urban Studies, Wayne State University, January, 1963.

and non-inspection states must be used with some caution. Nevertheless, Mayer and Hoult say that the difference between the average death rate of 4.64 deaths per 100 million miles in inspection states compared with 5.9 deaths per 100 million miles in non-inspection states is so striking that it is hard to dismiss it as being a mere chance occurrence.

Another misleading statistic is that only 5-10% of automobile accidents involve some sort of vehicle defect. Mayer and Hoult and others in the field dismiss this, however, because it is a well known fact that accident statistics are often inaccurate. Reasons cited to account for the fact that the percentage of accidents due to unsafe vehicles is not known are: vehicles are often damaged beyond the point of determining their condition at the time of the accident; accident investigators tend to concentrate on the condition of the driver rather than the condition of the car; too few investigators are trained to recognize evidence of unsafe vehicle condition; and in addition, drivers when questioned are reluctant to admit they were driving unsafe vehicles.

A third important fact to consider is that states experience a reduction in the number of vehicles rejected after their first year of mandatory PMVI. The rejection rate for New Jersey in 1938, which was the first year of inspection for that state, was 61.32%, while in 1955 the rejection rate had gone down to 37.70%. The District of Columbia, which has had a state owned system for many years, experienced an average rejection rate of 50.21% in 1961 that slowly declined to 40.96% in 1969.

Sherman and McCutcheon did a study of "The Influence of PMVI on Mechanical Condition"[4] in which they collected data from states having a varying number of inspections per year. Their findings were as follows:

Inspections/year	Rejection rate	Defects/rejected Vehicles
1	42.6%	2.17
2	34.1%	1.57
3	12.4%	1.28

They caution the reader, however, that other variables could enter into this difference. The Auto Club of Missouri reported from its diagnostic center that "in general, those vehicles which had not been previously inspected showed more rejections than those which had been looked at before."[5] About 20.9% of those cars which had been previously inspected were rejected by club inspectors for some defect while 30.3% of cars not previously inspected were rejected.

Buxbaum and Colton in their article on the "Relationship of MVI to Accident Mortality," cite statistics that show a decrease in the death rate as the number of inspections per year increases. They also show statistically that states with inspection programs prior to 1950 show a substantially reduced mortality rate compared with states which began inspecting between 1950 and 1960.

The California Highway Patrol recently conducted a study of "Mechanical Factors in Fatal Vehicle Accidents,"[6] in which they studied 409 fatal traffic accidents. Twenty-nine percent of the vehicles had one or more mechanical defects. Of those vehicles with defects, approximately 63% of the defects observed either caused or contributed to the accident in which it was involved. Tires, steering, and brakes were most often deficient, and older cars were more likely to have defects than newer cars. "Almost all of the mechanical defects were attributed to wear and lack of maintenance rather than design or assembly flaws."[7]

William A. Raftery, Vice-Chairman of the National Motor Vehicle Safety Advisory Council stated in a speech this year that;

> . . . "notwithstanding the fact that some safety leaders represent that there is a lack of 'hard data' which establishes a direct association between the safe condition of motor vehicles and accidents and deaths, and though few authors claim to have established an irrefutable case, the findings of virtually every research study nevertheless strongly associate component degradation to accidents and fatalities, and motor

4. "The Influence of PMVI on Mechanical Condition," by Harold W. Sherman and Robert W. McCutcheon, Highway Safety Research Institute, University of Michigan, Ann Arbor, Michigan, July, 1968.

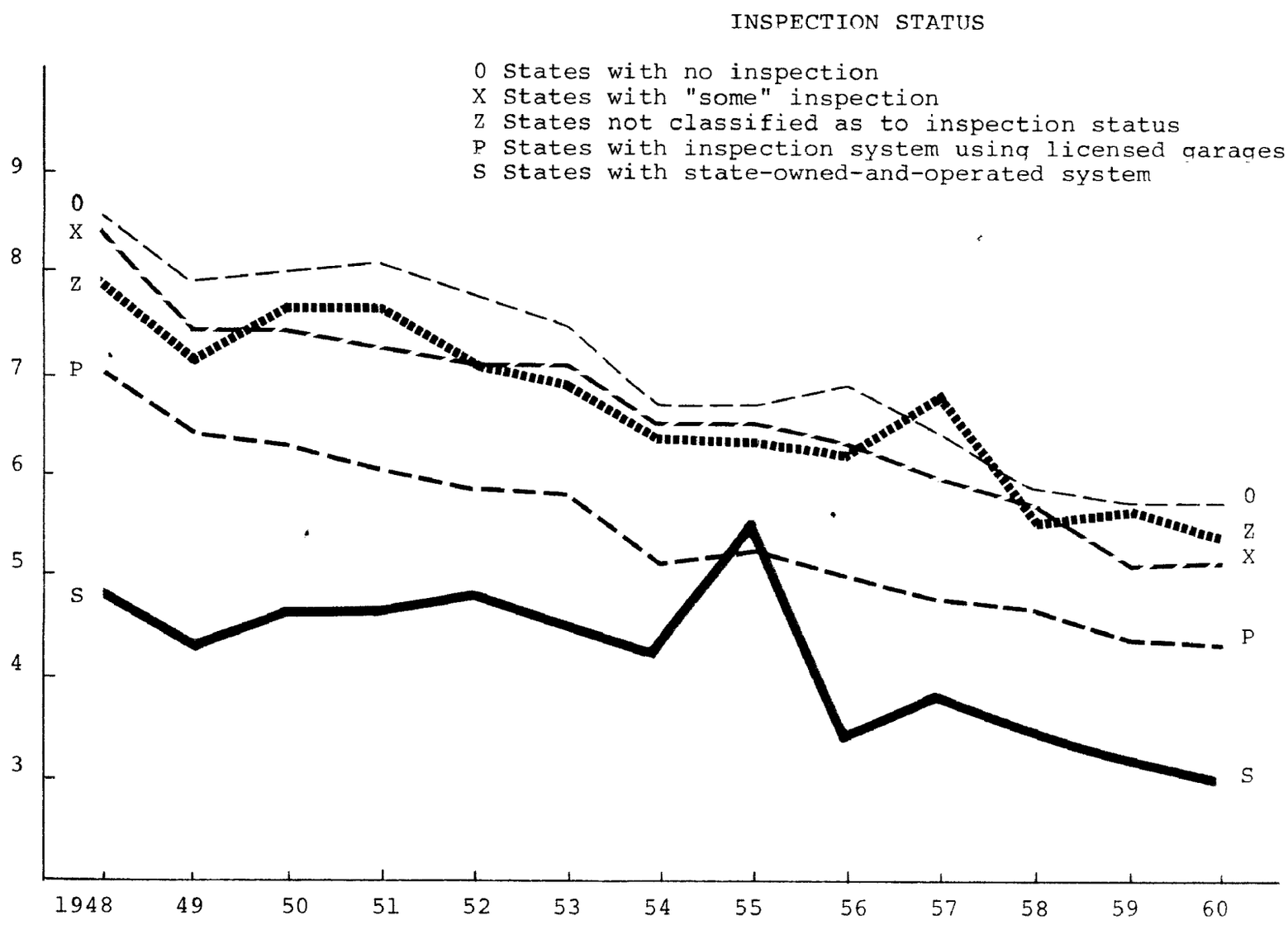
5. Vehicles in Use, and State Compulsory Vehicle Inspection, by F.B. Oldham of the Auto Club of Missouri, P. 43, August 6, 1970.

6. "Mechanical Factors Study," California Highway Patrol, February, 1970.

7. Ibid., p. 4.

8. William A. Raftery, "The Unsafe Vehicles in Use – They're All Yours," Partnership in Safety Symposium, January 21-22, 1971, Key Biscayne, Florida.

FIGURE 1.1 : NUMBER OF DEATHS, VEHICLE MILES & MOTOR VEHICLE DEATH RATE



Mayer and Hoult, MVI: Current Information, Measurement & Research, Chart 8, p. 44

FIGURE 1.2 NUMBER OF LIVES SAVED IF ALL STATES HAD DEATH RATES AS LOW AS STATES WITH STATE-OWNED INSPECTION SYSTEMS BY INSPECTION STATUS 1948-60

YEAR	STATE LICENSED PRIVATE GARAGES	STATES WITH SOME DEGREE OF INSPECTION	STATES CHANGING INSPECTION STATUS DURING PERIOD	STATES WITH NO INSPECTION	TOTAL UNITED STATES	NUMBER OF LIVES SAVED (A MINUS B*)
1948 A*	3,767	5,722	6,353	14,134	30,654	12,102
B	2,589	3,325	3,925	8,035	18,552	
1949 A	3,675	5,410	6,272	14,043	30,073	12,348
B	2,463	3,128	3,817	7,644	17,725	
1950 A	3,902	5,938	7,302	15,350	33,262	12,743
B	2,830	3,671	4,419	8,829	20,519	
1951 A	4,011	6,074	7,668	16,676	35,270	13,312
B	3,052	3,903	4,717	9,445	21,958	
1952 A	4,030	6,382	7,714	17,096	36,142	11,752
B	3,333	4,299	5,232	10,606	24,390	
1953 A	4,075	6,630	7,711	17,181	36,492	13,221
B	3,252	4,091	4,927	10,106	23,271	
1954 A	3,773	6,254	7,360	15,963	34,250	13,239
B	3,108	2,066	4,918	10,019	21,011	
1955 A	4,167	6,779	7,860	17,335	37,042	5,499
B	4,290	5,634	6,725	13,993	31,543	
1956 A	4,151	6,818	8,056	18,443	38,327	16,850
B	2,928	3,791	4,525	9,374	21,477	
1957 A	4,076	6,625	8,979	17,595	38,199	14,111
B	3,312	4,288	5,054	10,510	24,088	
1958 A	4,075	6,149	7,676	16,623	35,361	13,470
B	3,011	3,729	4,619	9,694	21,891	
1959 A	4,048	6,214	8,076	16,993	36,176	14,379
B	2,949	3,877	4,607	9,519	21,797	
1960 A	4,016	6,287	7,654	17,519	36,304	15,355
B	2,823	3,715	4,373	9,210	20,949	
Total 1948-1960						
A	51,766	81,282	98,681	214,951	457,552	168,381
B	39,940	49,517	61,858	126,984	289,171	

* "A" is the number of lives actually lost in motor vehicle accidents.
"B" is the number of lives that would have been lost if the State applied the same death rate as experienced in the State owned inspection states.

Mayer and Hoult, op. cit., p. 46.

vehicle inspections to substantial reductions in these accidents and deaths".[8]

Attitude toward PMVI

People are generally uninformed about PMVI and/or consider it a nuisance. They are reluctant to accept anything which they feel will cost them money, time, or reduce their driving pleasure. They have heard all the arguments against inspection and few have tried to convince them that PMVI will be beneficial to them. Until recently, legislators, concentrating mainly on the driver of the vehicle, have failed to recognize the importance of PMVI to highway safety.

Federal, state, and local government with the help of private auto and highway groups have initiated public awareness campaigns to educate people to the need for and the benefits of PMVI. A strong case can be made for the correlation between vehicle condition, vehicle inspection, and accidents. Motorists will support PMVI when they realize that it can lead to fewer accidents, lower repair bills, more accurate repair work, lower insurance, and a longer life for their car.

The Highway Safety Research Institute conducted a survey of highway departments of 30 states that did not have MVI legislation in 1966. The only thing they could conclude from their survey was that the level of interest concerning MVI was high and that the reasons for opposition were varied. One third of the respondents felt that abuses of the inspection system by licensed inspectors who required unnecessary repairs was significant. The implications of these findings for policy formulation are fairly clear. Fears seem to focus on implementation problems (i.e., abuses and costs) rather than upon the need for legislation in this area.

FEDERAL SAFETY REQUIREMENTS

This section contains a brief discussion of the laws pertaining to motor vehicle and traffic safety (including the uniform vehicle code), highway safety standards in force today, motor carrier safety regulations, and future government actions in these fields.

Federal Law

The Highway Safety Act of 1966, requires states to have a highway safety program "approved by the Secretary, designed to reduce traffic accidents and deaths, injuries and property damage resulting therefrom."[9] The Secretary is authorized to establish uniform standards--which the state programs must meet--which have as their purpose: (1) To improve driver performance (including driver education, on-the-road testing of driver skill, driver examinations, and driver licensing); and (2) To improve pedestrian performance. In addition, the standards include provisions for an effective record keeping system for accidents; accident investigation to determine the cause of accidents, injuries, and deaths; vehicle registration, operation, and inspection; highway design and maintenance; traffic control; vehicle codes and laws; surveillance of traffic for detection and correction of high or potentially high accident locations; and emergency services. There are presently 16 standards,[10] the first of which deals with periodic motor vehicle inspection. The stated purpose of standard 4.4.1 is to increase the likelihood that vehicles operated on public highways are properly equipped and maintained in reasonably safe working order. This standard calls for each state to have a program for periodic inspection of all vehicles (or some other experimental or pilot program) in order to reduce the number of vehicles that have conditions "which cause or contribute to accidents or increase the severity of accidents which do occur, and shall require the owner to correct such conditions." As a minimum requirement, every vehicle registered in the state is to be inspected at the time of registration and at least annually thereafter or at such time as is designated in an experimental or pilot program.

Because Maryland does not comply with Federal Safety Program Standard 301 requiring an acceptable periodic motor vehicle inspection program, the State could be assessed a penalty of nearly $15 million or 10% of the Federal-Aid Highway funds in Fiscal Year 1973.[11] In addition, the State

8. William A. Raftery, "The Unsafe Vehicles in Use -- They're All Yours," Partnership in Safety Symposium, January 21-22, 1971, Key Biscayne, Florida.

9. Public Law 89-564.

10. Highway Safety Program Standards, U.S. Department of Transportation, National Highway Safety Bureau, June, 1969.

11. Pursuant to Title 23, U.S.C., 403 (c)

fails to comply with Standard 303 which requires each motorcycle to be inspected at the time of registration and at least annually thereafter. Compliance with three other standards[12] which call for rapid entry and updating of information would be facilitated by a coordinated motor vehicle service program.

The second important law, the National Traffic and Motor Vehicle Safety Act of 1966 defines in the opening paragraph "that the purpose of this Act is to reduce traffic accidents and deaths and injuries to persons resulting from traffic accidents."[13] Among other things, the law requires that the Secretary of Commerce establish Federal motor vehicle safety standards for motor vehicles and equipment in interstate commerce. These standards are issued periodically for tires, brakes, windshield, head restraints, etc. and compiled in "Federal Motor Vehicle Safety Standards and Regulations."[14]

These standards must meet the following criteria: (1) They must meet the need for motor vehicle safety, i.e., they must be directed toward protecting the public from unreasonable danger resulting from design, construction, and performance of vehicles; (2) The standards must be design and production feasible in addition to being economically feasible; and (3) Standards must be capable of objective measurement.

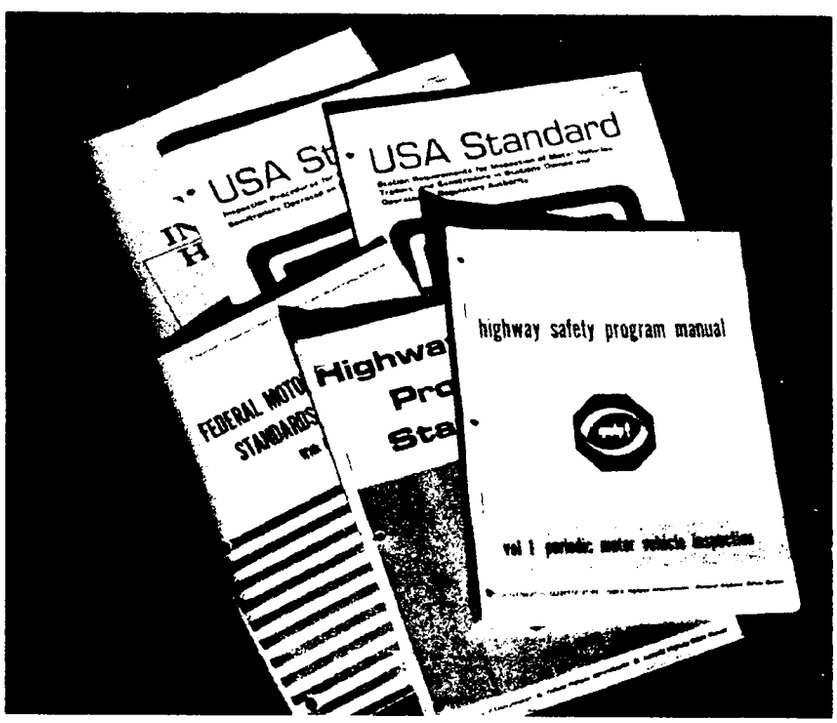
The Highway Safety Bureau recently did a study of motor vehicle safety in order to update and issue new safety standards.[15] A research program is underway to determine safe operating conditions and in the field of automotive safety technology. But more research will still have to be done in such areas as safety-related defects; the performance on the road of vehicle systems; vehicle deterioration; repairability of vehicle systems and components; and the reliability of maintenance and repair work.

12. FSPS No. 305, 307 and 310.

13. Public Law 89-563.

14. Issued by the National Highway Safety Bureau in the Department of Transportation.

15. Program Plan for Motor Vehicle Safety Standards. 1970-1972, National Highway Safety Bureau, Motor Vehicle Programs, June, 1970, revised September 1970.



The Highway Safety Act of 1970, amending the 1966 Act, established a National Highway Traffic Safety Administration (NHTSA) with unspecified duties, and did not change the Highway Safety standard or MVI requirements. Thus the National Highway Traffic Safety Administration relies upon these three laws and the highway and motor vehicle safety standards.

The Automotive Safety Foundation has done a comparison of Maryland's highway safety standards with the National Highway Safety Bureau standards. This includes a discussion of Federal laws, USASI standards, and the uniform vehicle code.[16] There is further discussion of inspection standards in Chapter 9 of this report.

Uniform Vehicle Code

The Uniform Vehicle Code is a specimen set of motor vehicle laws, designed as a comprehensive guide for state motor vehicle laws. It has been prepared by the National Committee on Uniform Traffic Laws and Ordinances to assist states in adopting uniform traffic laws. Among its recommended provisions, it sets forth the following suggestions:[17]

1. No vehicle may be operated without certain required equipment or in an unsafe condition;
2. The State Highway Patrol or other designated state agency may require a vehicle to be tested for safety condition at any time;
3. If the vehicle is found to be in unsafe condition, it must be repaired in five days;
4. Every vehicle should undergo inspection annually, but not more than twice a year.

Motor Carrier Safety Regulations

The regulations governing trucks, trailers, and buses are spelled out by the Federal Highway Administration in regard to parts and accessories necessary for safe operation, qualifications of drivers, recording and reporting of accidents, inspection and maintenance.[18] The paragraph entitled "Compliance" states that "every motor carrier, its officers, drivers, agents, representatives, and employees directly concerned with the inspection or maintenance of motor vehicles, shall comply and be conversant with the requirements of this part." (Title 49, Ch. III, Part 396) Every motor carrier must inspect and maintain its vehicles and the required accessories to insure that they are in safe and proper operating condition and a record of inspection and maintenance must be kept for each vehicle. The inspection for buses must include a test of all push-out windows and emergency windows at least once every 90 days to insure they are operating properly and comply with the Federal Requirements. Vehicles damaged in an accident or by some other means must be inspected before they are driven again.

DOT Safety Standard Research

The Department of Transportation in a 1968 report on safety for motor vehicles[19] recommended several improvements in the vehicle inspection program. The Department of Transportation advocates the consolidation of all motor vehicle inspection programs required under separate Federal and state laws and coordination of all levels of government. This would include standards for exhaust emissions, brakes, steering, and other safety regulations. It would enable the consumer to have his vehicle inspected for all health and safety items at one stop. Not only would this save him time but it would also give him a better idea of the condition of his engine. With improved inspection procedures and equipment, diagnostic checks could be made on the condition of the engine that would help to avoid breakdown and costly repairs later.

The Department of Transportation plan is to cooperate with the Department of Health, Education and Welfare in coordinating vehicle inspections at the state level and to use

16. Maryland's Highway Safety Needs in Periodic Motor Vehicle Inspection--A Report, Automotive Safety Foundation, 1969, pp. 30-51.

17. SEE the Uniform Vehicle Code, Chapter 13, for the full set of recommended regulations.

18. Title 49, Chapter III, USC.

19. U.S. Department of Transportation Report on Safety for Motor Vehicles in Use, June, 1968,pp 6-9.

FIGURE 1.3 MOTOR VEHICLE DEATH RATE BY STATE, 1971

STATE	TYPE INSP.	INSP. YEAR	DEATH RATE*	DEATH RATE**
Alabama	none		6.3	5.7
Alaska	none		7.8	7.4
Arizona	none		6.3	6.8
Arkansas	SA	1	5.4	6.2
California	Random Spot		4.2	3.9
Colorado	SA	2	5.2	4.7
Connecticut	none		2.7	2.6
Delaware	**SO**	**1**	**5.1**	**4.2**
D. C.	**SO**	**1**	**4.3**	**N.A.**
Florida	SA-O	1	5.2	5.2
Georgia	SA	1	6.1	6.8
Hawaii	SA	1 or 2	4.5	3.8
Idaho	SA	1	6.8	6.3
Illinois	Trucks only		4.2	4.3
Indiana	SA	1	4.8	5.3
Iowa	none		4.9	4.9
Kansas	none		4.9	4.1
Kentucky	SA	1	5.4	6.0
Louisiana	SA	1	7.1	6.5
Maine	SA	2	4.5	5.3
Maryland	Used Vehicles		3.8	4.1
Massachusetts	SA	2	3.5	3.6
Michigan	Random Spot		4.1	4.5
Minnesota	Random Spot		4.4	4.3
Mississippi	SA	1	7.7	7.9
Missouri	SA	1	5.7	6.0
Montana	none		6.5	6.2
Nebraska	SA	1	4.3	4.2
Nevada	none		7.4	7.1
New Hampshire	SA	2	4.4	4.9
New Jersey	**SO**	**1**	**3.2**	**3.5**
New Mexico	SA	2	7.6	8.7
New York	SA	1	4.5	4.6
North Carolina	SA	1	6.0	6.1
North Dakota	Random Spot		4.6	4.0
Ohio	Random Spot		4.6	4.2
Oklahoma	SA	1	4.7	4.9
Oregon	Random Spot		5.1	4.8

FIGURE 1.3 MOTOR VEHICLE DEATH RATE BY STATE, 1971

STATE	TYPE INSP.	INSP. YEAR	DEATH RATE*	DEATH RATE**
Pennsylvania	SA	2	4.0	3.7
Rhode Island	SA	1	3.0	2.8
South Carolina	SA	1	6.2	7.5
South Dakota	SA	1	5.1	5.4
Tennessee	none		6.6	6.7
Texas	SA	1	5.2	5.1
Utah	SA	1	5.5	5.2
Vermont	SA	2	4.6	5.3
Virginia	SA	2	4.3	5.4
Washington	Random Spot		4.2	3.9
West Virginia	SA	1	6.6	6.2
Wisconsin	Random Spot & Selected Garage		4.6	5.2
Wyoming	SA	1	6.4	7.5

*Traffic Deaths per 100,000,000 vehicle miles
**Traffic Deaths per 10,000 Registered Motor Vehicles

SA-State Appointed SO-State owned

l the available resources provided under the various bills to rovide effective inspection at the minimum cost and nconvenience.

he Department of Transportation also plans to study the llowing items:

1. Investigate the feasibility of broadening the scope of new vehicle standards to cover safety performance after periods of extended use.
2. Investigate the alternatives for meeting the heavy capital outlays needed for motor vehicle inspection equipment.
3. Investigate all aspects of the demands that used vehicle inspection programs will place on consumers including means of protecting them from unsatisfactory repairs and unsafe vehicles.

2

MARYLAND'S EXISTING MOTOR VEHICLE INSPECTION

HISTORY

The State of Maryland has long been concerned with maintaining safety of motor vehicles by means of inspection programs. Maryland, Delaware, Massachusetts, New Jersey, New York, and Pennsylvania took the first steps in 1927-29 when they declared "Save-a-Life" campaigns. All motor vehicle owners were requested to have their vehicles inspected at certain designated garages during a specific two to three week period. In 1929, the Maryland legislature passed a law making it mandatory for all vehicles to be inspected at officially appointed garages. After several years of experience, however, the inspection program was discontinued due to inefficiency and public disfavor.

In 1963, the Legislature again considered the subject of motor vehicle inspection and recommended a State-owned and operated system, but no action was taken because of the costs involved in establishing such a system. The old law remained on the books until 1965 when it was repealed and a new law was passed requiring inspection at State appointed stations for all used passenger vehicles when sold or transferred.[1]

The New Jersey, New York, Massachusetts, Delaware, and Pennsylvania inspection programs evolved into mandatory periodic inspection of all vehicles at either state owned or appointed stations. Other states like California and Ohio developed random spot inspection programs, while some states still have no inspection program. Maryland has been studying alternative systems of motor vehicle inspection for several years in order to conform with the Federal law by establishing an "approved MVI program," and has commissioned two very good studies of MVI: "The Report of the Committee to Study Motor Vehicle Inspection Laws," November 14, 1962; and "Maryland's Highway Safety Needs in PMVI--A Report," by the Automotive Safety Foundation. As of January, 1971, however, Maryland remains one of eleven states that does not require some form of periodic inspection for all passenger vehicles.

The existing Maryland law, which went into effect January 1, 1966, is jointly administered by the Motor Vehicle Administration and the Auto Safety Enforcement Division (ASED) of the State Police. When a used car is sold, the owner must present it for inspection at a licensed inspection station which issues him a certificate if the car passes. The new owner must have the certificate before the car can be re-registered in his name. This inspection law has resulted in the inspection of approximately 15% of the cars registered in the State and has, to some extent, kept Maryland from becoming a junk yard for unsafe and unsound vehicles.

Administration and Standards

The Automotive Safety Enforcement Division is authorized to approve the facilities of auto dealers, garages, and gas stations as official inspection stations. Every facility must have a qualified mechanic available during working hours who has attended a school of instruction and meets the following requirements:

1. At least 18 years of age;
2. A minimum of twelve months motor vehicle repair experience;
3. Passed the written exam administered by the State Police;
4. Familiar with the inspection handbook and able to perform all required inspection procedures;
5. Has an operator's license and is capable of road testing the vehicle.

There are about 2,300 mechanics certified to perform MVI's in the State of Maryland at the present time.

Licensed facilities must pass specified location and equipment requirements:

1. The facility must be open to the general public during regular business hours;
2. It must meet certain space requirements and have the necessary equipment to carry out the inspection.[2]

1. See AAA Foundation for Traffic Safety, A Study of MVI, April, 1967, for further history.

2. See the Automobile Inspection Handbook for Authorized Inspection Stations.

There are presently about 1,190 authorized inspection stations in Maryland: New Car Dealers---368; Used Car Dealers---52; Gas Service Stations---457; Independent Garages---272; and Miscellaneous---41.

The law does not set any fee for inspection but has left it to the discretion of the individual inspection stations based upon the following guidelines:

> "The fee for inspections shall be based on the time for inspection at the normal hourly flat rate for similar mechanical work. The inspection time should generally average approximately one hour."[3]

The average time for inspection is 45 minutes to an hour, and costs the owner about $6, based on a rate for similar mechanical work.[4]

In addition to the foregoing inspection program, Maryland law provides for the on-the-road inspection of vehicles by any Maryland law officer. When a vehicle is observed that fails to meet minimum safety requirements, a Safety Equipment Repair Order is issued for the defective equipment which must be repaired within ten days and returned to an inspection station within an additional twenty days for reinspection. If an owner fails to comply with a repair order within the alloted time, a notice of suspension of the registration plates is issued. The State Police suspend about 25,000 licenses a year as a result of failure to comply with Safety Equipment Repair Orders. Vehicle owners who ignore the suspension order have their tags picked up by the State Police.

On-the-road warnings give the Police the power to take critically defective vehicles off the road. This is especially important in a State like Maryland in which only 15% of the total vehicle population is required to have safety inspections. It will remain an important service even after a PMVI program is instituted to insure that safe operating vehicles are maintained.

When the program began in 1966, law officers issued 95,571 on-the-road warnings for defective private passenger vehicles; 86,902 were issued in 1968; 64,442 in 1969; and 98,218 in FY 1970. Out of a total of 152,305 reported defects in FY 1969-70, 31,272 were for tail lights that failed to meet specifications. Some of the other items most often found defective are:

Headlights	28,970
Exhaust Systems	19,404
Tag Light (s)	16,128
Stop Light (s)	15,399
Tires	13,676

Under the present inspection program, a problem that the State Police have encountered is the improper maintenance of records by the inspection stations. Stations must keep records on certificates issued, serial numbers obtained from vehicles, current mileage of inspected vehicles, list of defects of vehicles inspected, and repair work, if performed by the station.[5] From July 1, 1969 to June 30, 1970, more than 295,000 used vehicles were inspected at licensed inspection stations, but since figures have not been kept on the total number and type of defects found, there is no way of knowing what percentage of vehicles are initially rejected.

In addition to the fee that the owner pays to the station, he also pays $2 at the time the title is transferred which serves to finance the inspection program. In 1970, the total appropriation to the ASED for administration of the inspection program was $691,482. The largest portion of this, $477,790, went for salaries. There are 33 station supervisors and nine administrators who work full time on MVI, and other troopers (about 42 in all) who spend about 70% of their time on MVI. The next largest cost was $57,715 for fixed charges (mostly for data processing) and $30,000 for motor vehicle maintenance.

A minimum of one scheduled check is made monthly on each inspection station. During FY 1970, troopers made 24,997 such visits. No station licenses were revoked or suspended that year; however, in the previous three and one half years, 86 station licenses have been suspended or revoked following a formal hearing. The major reason for such action has been improper inspection. Violation of rules and overselling have also been grounds for removal of licenses.

3. Rules and Regulations, Bk. No. 7, Motor Vehicle Inspection, November 16, 1970, Department of Motor Vehicles, Glen Burnie, Maryland, p. 8.

4. In FY 1970, 869 out of a total of 1,190 licensed stations charged $6 or less; 321 stations charged in excess of $6.

5. See Automobile Inspection Handbook, op. cit.

Abuses

Sinse the MVI program was started in 1966, public complaints, concerning the 15% of vehicle population inspected, have totalled:

1966	1967	1968	FY 1970
1,417	855	846	708

Of the FY 1970 complaints, after investigation, 22% were found to be valid--the same percentage holding true for previous years.

The complaints in Maryland are different than those of other states because Maryland is ordinarily dealing with a seller who wants his car passed. Thus most of the complaints that ASED gets are from dissatisfied buyers who complain that their car has a defect which the inspecting station did not report (i.e., the car should not have passed). This complaint is really against the seller, however, not against the inspecting station. Another frequent complaint is from those who have been refused an inspection at a licensed station. The ASED has found that some used car dealers have inspection stations only for the purpose of inspecting and passing their own cars or make exclusive agreements with garages to insure that their cars pass, in some cases without even having the vehicle checked. These dealers either set their inspection fee so high that outsiders will not come in or they simply refuse to inspect other cars. Troopers who find a violation of the inspection law can arrest the mechanic or owner on the spot and charge him with violation of the traffic law.

The ASED reports that they have had very few complaints against stations trying to sell people unnecessary repairs or parts, or that wheels were not put back on correctly after having been pulled for inspection. There have been complaints that the fee charged was too high, or that repairs were not done properly.

In actuality, the number of complaints against the system and validated abuses have been few. The Maryland public (excluding those who buy or sell a used car) is generally not acquainted with the inspection law. The ASED estimates that if there were a state appointed inspection system for all Maryland cars they would need an additional 800 licensed stations plus some 200 fleet stations for companies that have 25 or more vehicles.

3

MARYLAND'S PROJECTED GROWTH PATTERNS

INTRODUCTION

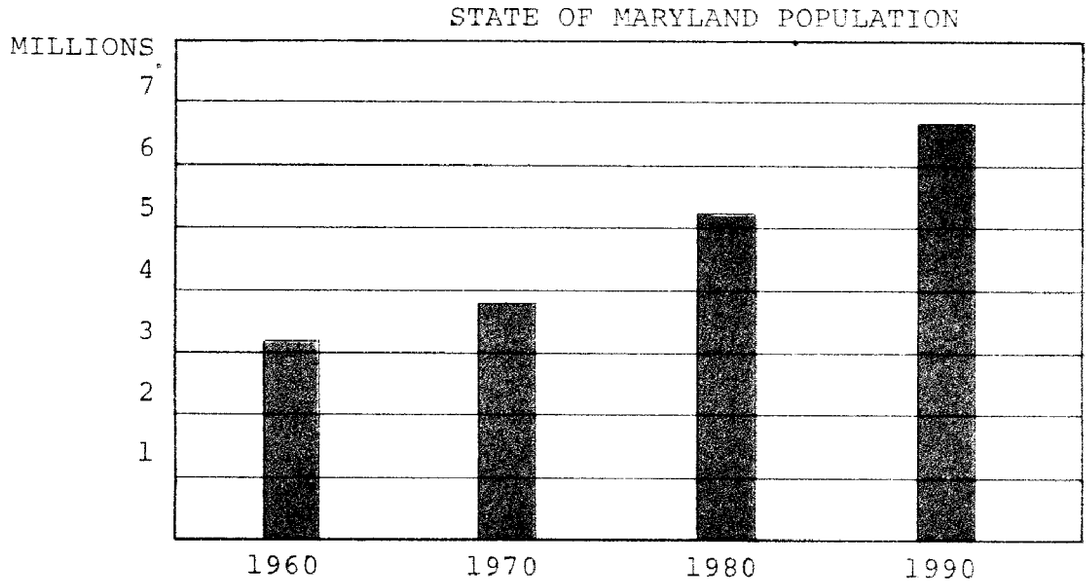
Through examination of historic and projected economic and population data within the State of Maryland, the population for the State, including each of its counties (23), plus the City of Baltimore, has been projected to 1980. Coupling this analysis with that of motor vehicle registration within each of the counties over the past ten years has resulted in a forecast of motor vehicle registration to 1980. The projections are presented as ingredients of the final criteria for determining the appropriate number of PMVI stations to be established in Maryland.

This section of the report is divided into four parts. Following the introduction, a brief overview of the Maryland economic climate is presented. The third part outlines the pertinent findings in projecting a motor vehicle population in Maryland in 1980 of 2,700,000 vehicles. This number of motor vehicles represents an increase of 43% over the 1,890,314 registered vehicles in the State in 1970. The fourth part further clarifies the distribution of motor vehicles within the State by the type of vehicle.

The Maryland Economic Climate

Essential to the planning of any capital improvement is a basic understanding of the current and expected need for that particular improvement. The basis for determining the needed supply of PMVI centers in this report is through an analysis of vehicle density. Vehicle density is closely related to population and the ability of people to purchase motor vehicles.

Maryland's population has been increasing significantly since 1950. As illustrated in Figure 3.1 the State population increased 32.3% between 1950 and 1960 to a population of just over three million. The rate of increase, while somewhat less between 1960 and 1970, was a substantial 26.5%. The State population is projected to grow 31.7% by 1980 and 30.2% between 1980 and 1990 with the total population reaching 6,725,500 people.



Source for this figure: U. S. Census 1960-1970, Projections--Maryland State Planning Department, University of Maryland Bureau of Business and Economic Research. Adjustments by Marcou, O'Leary and Associates.

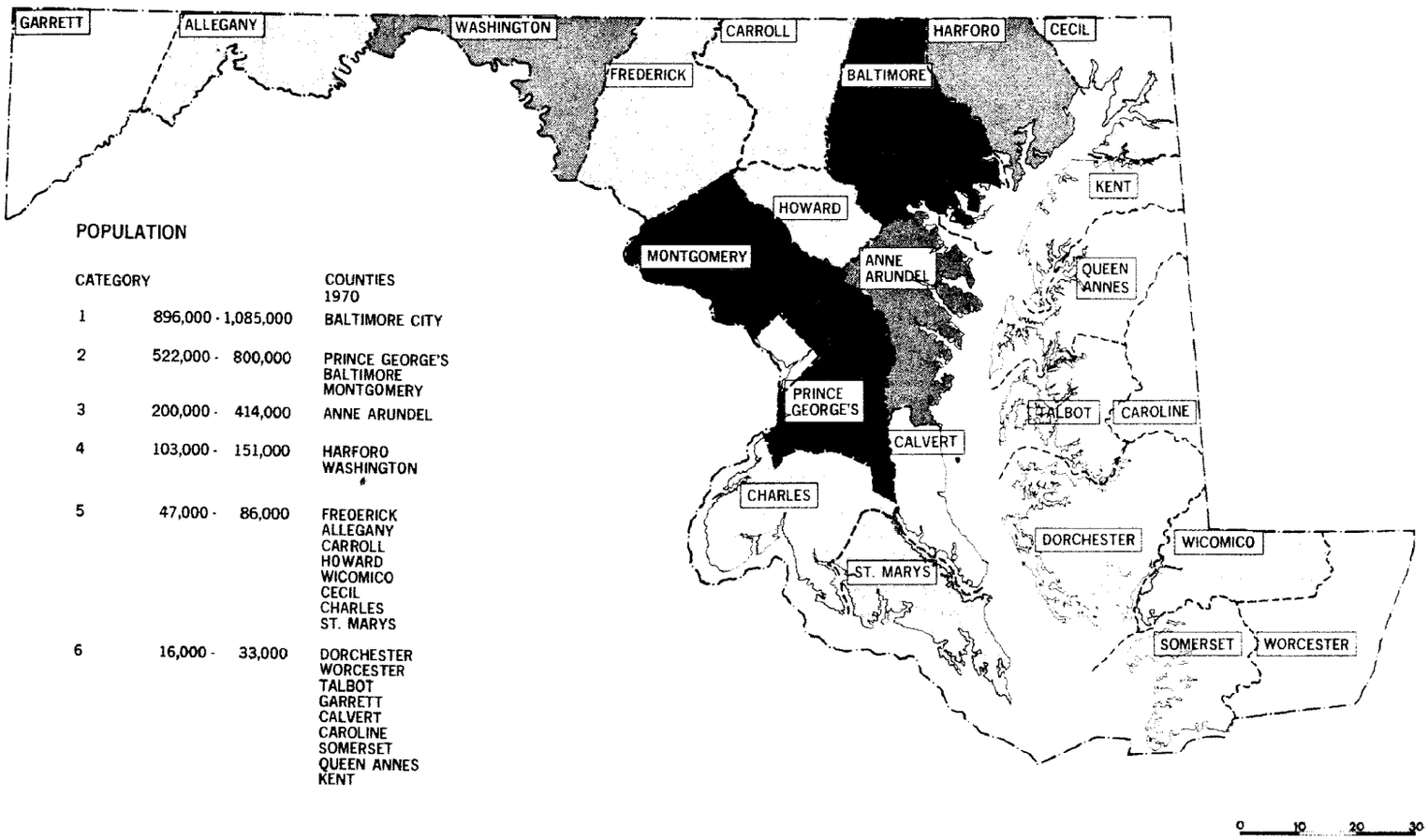
Another major economic trend which is closely watched is the Maryland gross state product. Between 1960 and 1970, the gross state product grew from 9.3 billion to 17.3 billion dollars. Over this ten-year period, there was an 86% increase in the gross state product. Using 1970 prices, the Maryland Department of Economic Development expects this upward trend to continue so that by 1980, the gross state product figure should be about 27.5 billion dollars, or 60% higher in 1980 than in 1970. Using constant dollars (1957-1959 dollars), the Department of Economic Development projects a constant growth in per capita income in Maryland of $4,000 in 1980 compared to $3,700 for the United States. The State average disposable household income ranges from nearly $16,000 in Montgomery County to a low of almost $6,000 in Garrett County. Clearly, the higher the income, the greater the amount available for discretionary spending.

One commodity affected by levels of discretionary spending is the automobile. The "1970 Automobile Facts and Figures"

FIGURE 3.1 STATE CENSUS AND PROJECTED POPULATION--1970 COMPARED TO 1980*

COUNTY	1970	% OF TOTAL	1980	% OF TOTAL
Allegany	84,044	2.1	85,600	1.7
Anne Arundel	297,539	7.6	414,000	8.0
Baltimore	621,077	15.8	799,200	15.5
Calvert	20,682	.5	26,100	.5
Caroline	19,781	.5	20,500	.4
Carroll	69,006	1.8	80,400	1.6
Cecil	53,291	1.4	56,000	1.1
Charles	47,678	1.2	75,300	1.5
Dorchester	29,405	.8	32,100	.6
Frederick	84,927	2.2	123,700	2.4
Garrett	21,476	.5	22,100	.4
Harford	115,378	3.0	150,700	3.0
Howard	61,911	1.6	200,000	3.9
Kent	16,146	.4	18,800	.4
Montgomery	522,809	13.3	759,800	14.7
Prince Georges	660,567	16.8	1,084,600	21.0
Queen Anne	18,422	.5	19,500	.4
St. Marys	47,388	1.2	56,500	1.1
Somerset	18,924	.5	19,900	.4
Talbot	23,682	.6	25,000	.5
Washington	103,829	2.6	113,900	2.2
Wicomico	54,236	1.4	58,500	1.1
Worchester	24,442	.6	25,500	.5
Baltimore City	905,759	23.1	896,400	17.4
Total	3,922,399		5,164,100	

* 1980 was mutually agreed upon by the Department of Motor Vehicles Key Staff and the Consultants as a target year for planning purposes.

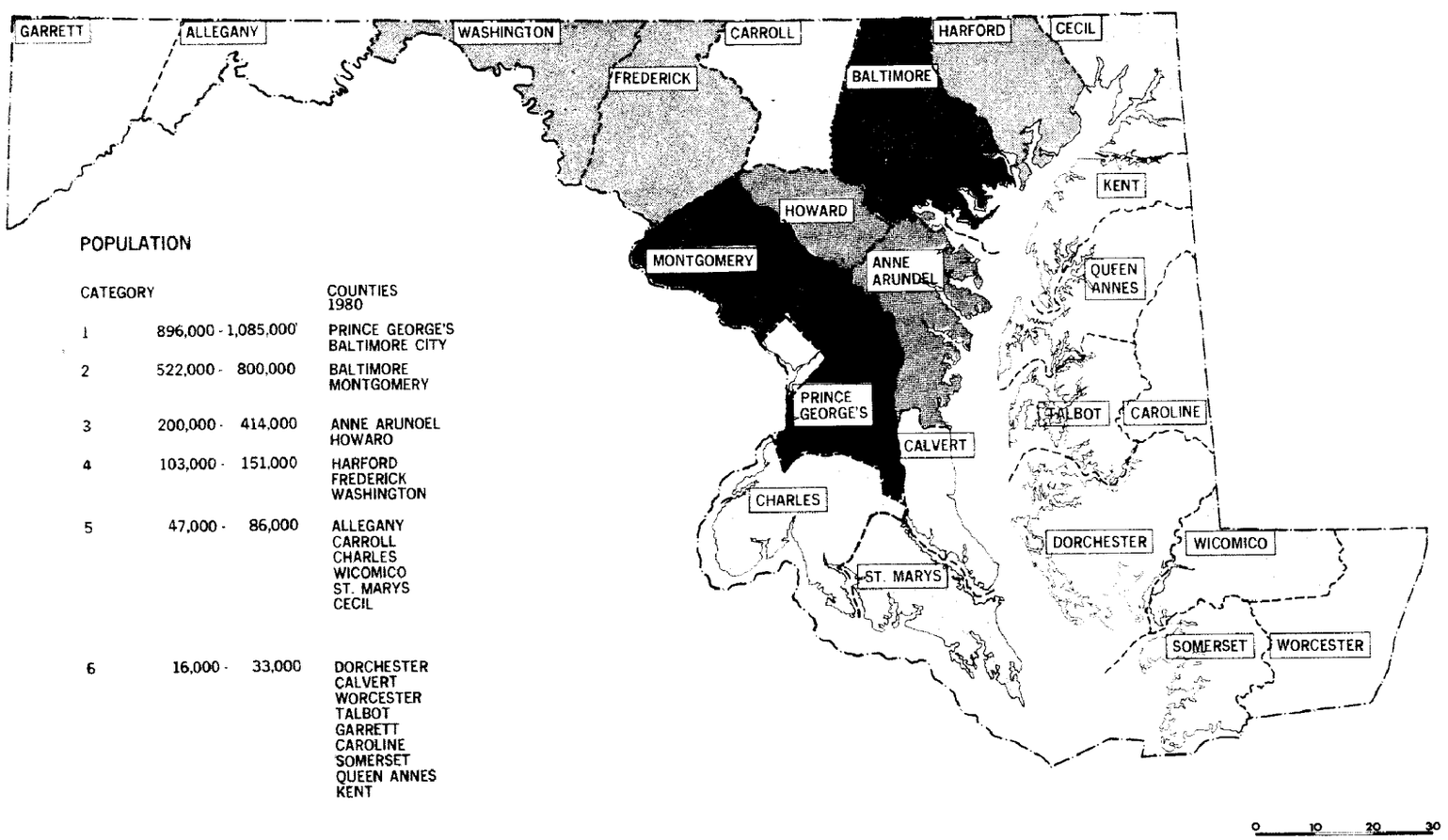


POPULATION

CATEGORY		COUNTIES 1970
1	896,000 - 1,085,000	BALTIMORE CITY
2	522,000 - 800,000	PRINCE GEORGE'S BALTIMORE MONTGOMERY
3	200,000 - 414,000	ANNE ARUNDEL
4	103,000 - 151,000	HARFORD WASHINGTON
5	47,000 - 86,000	FREDERICK ALLEGANY CARROLL HOWARD WICOMICO CECIL CHARLES ST. MARYS
6	16,000 - 33,000	DORCHESTER WORCESTER TALBOT GARRETT CALVERT CAROLINE SOMERSET QUEEN ANNES KENT

COUNTY POPULATIONS—1970

FIGURE 3.2



POPULATION

CATEGORY			COUNTIES 1980
1	896,000 -	1,085,000	PRINCE GEORGE'S BALTIMORE CITY
2	522,000 -	800,000	BALTIMORE MONTGOMERY
3	200,000 -	414,000	ANNE ARUNOEL HOWARO
4	103,000 -	151,000	HARFORD FREDERICK WASHINGTON
5	47,000 -	86,000	ALLEGANY CARROLL CHARLES WICOMICO ST. MARYS CECIL
6	16,000 -	33,000	DORCHESTER CALVERT WORCESTER TALBOT GARRETT CAROLINE SOMERSET QUEEN ANNES KENT

COUNTY POPULATIONS—1980

FIGURE 3.3

book prepared by the Automobile Manufacturers Association points out that as income rises the percentage of automobile owners in a given income bracket who purchase two or more cars increases. The households purchasing two or more cars increased at a rate of about two percent per annum between 1965 and 1969.

Population and Motor Vehicle Growth Patterns to 1980

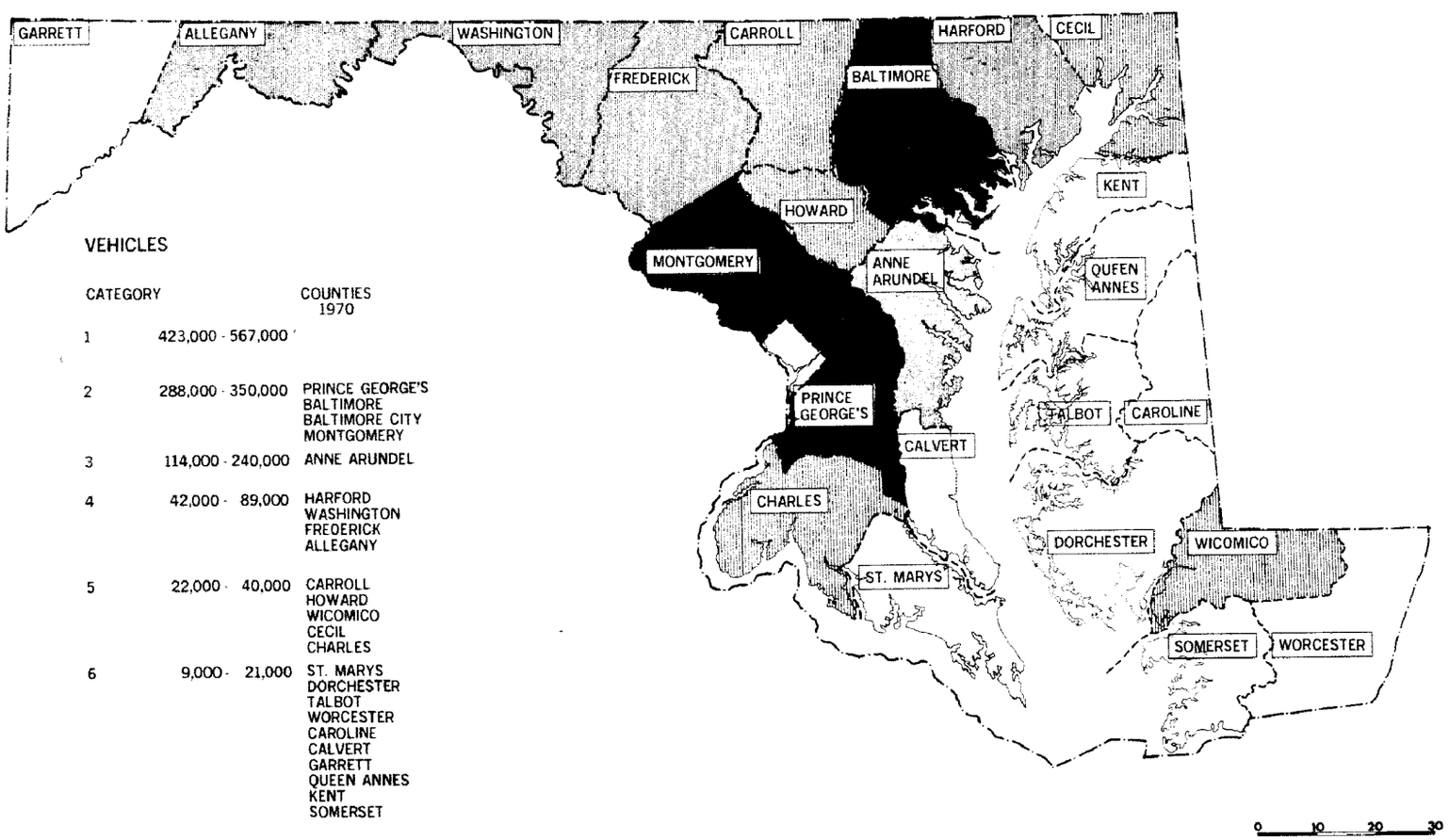
With continued economic expansion in Maryland the population is projected to grow significantly. Between 1960 and 1970 the population expanded by over 26%. Between 1970 and 1980 the State population is projected to grow from 3,922,399 to 5,164,100, an increase of almost 32%.

Registered motor vehicles are projected to increase approximately 43% to 1980 from 1,890,314 in 1970 to 2,700,000 in 1980. Figure 3.3 illustrates the State census of population for 1970 compared to the projected population for 1980. Included with the population figures are two columns showing the percent of the total State figure each county, and the City of Baltimore, maintains for the years 1970 and 1980.

Note in Figure 3.3 the relatively similar rank each county maintains in relation to the total population for 1970 and 1980. Other than the loss in relative position by many of the rural counties, the significant differences in rank order of size are seen in Howard, Montgomery, Prince Georges Counties,

FIGURE 3.4 MOTOR VEHICLE REGISTRATIONS & PROJECTIONS
1970 COMPARED TO 1980

COUNTY	1970	% OF TOTAL	1980	% OF TOTAL
Allegany	42,464	2.2	49,683	1.8
Anne Arundel	147,414	7.8	239,108	8.6
Baltimore	324,277	17.2	423,182	15.7
Calvert	11,158	.6	18,624	.7
Caroline	12,787	.7	14,000	.5
Carroll	39,140	2.1	45,969	1.7
Cecil	25,769	1.4	29,232	1.1
Charles	22,435	1.2	39,307	1.5
Dorchester	17,115	.9	20,756	.8
Frederick	46,505	2.4	64,571	2.4
Garrett	10,714	.6	12,536	.5
Harford	55,821	2.9	88,665	3.3
Howard	35,570	1.9	114,400	4.2
Kent	9,811	.5	12,376	.5
Montgomery	288,672	15.3	426,616	15.8
Prince Georges	325,985	17.2	566,161	21.0
Queen Anne	10,476	.5	12,179	.5
St. Marys	18,924	1.0	29,493	1.1
Somerset	9,338	.5	10,388	.4
Talbot	14,937	.8	19,050	.7
Washington	54,940	2.9	60,456	2.2
Wicomico	33,196	1.8	36,537	1.4
Worchester	14,726	.8	16,311	.6
Baltimore City	318,140	16.8	350,400	13.0
Total	1,890,314		2,700,000	

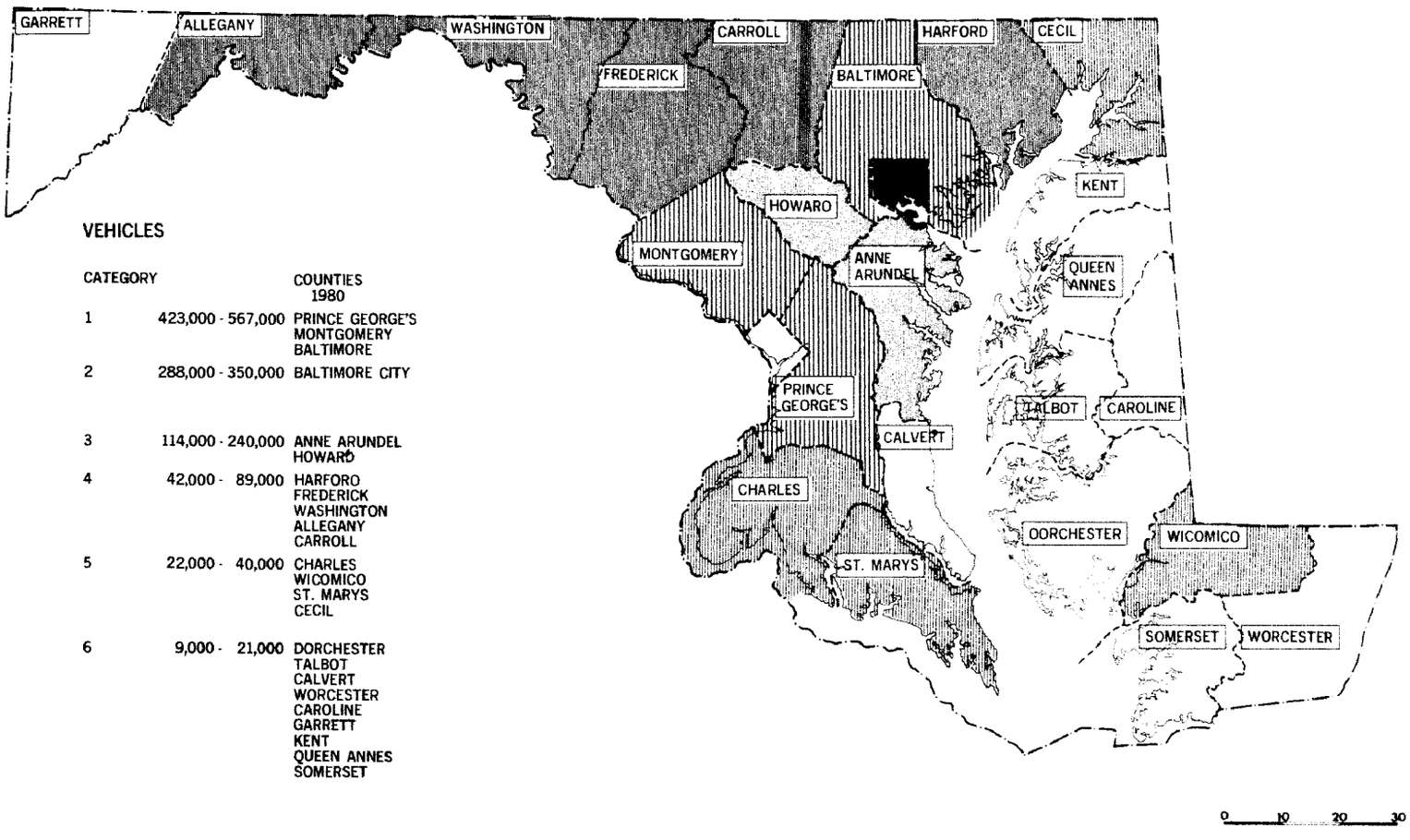


VEHICLES

CATEGORY		COUNTIES 1970
1	423,000 - 567,000	
2	288,000 - 350,000	PRINCE GEORGE'S BALTIMORE BALTIMORE CITY MONTGOMERY
3	114,000 - 240,000	ANNE ARUNDEL
4	42,000 - 89,000	HARFORD WASHINGTON FREDERICK ALLEGANY
5	22,000 - 40,000	CARROLL HOWARD WICOMICO CECIL CHARLES
6	9,000 - 21,000	ST. MARYS DORCHESTER TALBOT WORCESTER CAROLINE CALVERT GARRETT QUEEN ANNES KENT SOMERSET

VEHICLE REGISTRATIONS—1970

FIGURE 3.5



VEHICLES

CATEGORY		COUNTIES 1980
1	423,000 - 567,000	PRINCE GEORGE'S MONTGOMERY BALTIMORE
2	288,000 - 350,000	BALTIMORE CITY
3	114,000 - 240,000	ANNE ARUNDEL HOWARD
4	42,000 - 89,000	HARFORD FREDERICK WASHINGTON ALLEGANY CARROLL
5	22,000 - 40,000	CHARLES WICOMICO ST. MARYS CECIL
6	9,000 - 21,000	DORCHESTER TALBOT CALVERT WORCESTER CAROLINE GARRETT KENT QUEEN ANNES SOMERSET

VEHICLE REGISTRATIONS—1980

FIGURE 3.6

and Baltimore City. To a somewhat lesser extent Anne Arundel is growing significantly too. As has been suggested, motor vehicle registration closely correlates to population. Note in Figure 3.5 that most of the rural counties have maintained a relatively similar rank order in registered motor vehicles in 1970 and 1980. Likewise, Howard, Montgomery, and Prince Georges Counties show the greatest increase in projected motor vehicle registration and rank order significance. Baltimore County and City, while increasing in population, suggest the point of diminishing utility for use of the automobile in high density areas providing other means of transportation. Anne Arundel County has a projected growth in motor vehicle registration of over 62% by 1980. Coupled with its population growth, the county will rank among the top five in the number of motor vehicles by 1980.

The ten counties projected to have the greatest number of motor vehicles in 1980, in descending order are:

COUNTIES	NUMBER OF MOTOR VEHICLES
Prince Georges	566,161
Montgomery	426,616
Baltimore	423,182
Baltimore City	350,400
Anne Arundel	239,108
Howard	114,400
Harford	88,665
Frederick	64,571
Washington	60,456
Allegany	49,683

Population and Motor Vehicle Registration Distribution

To facilitate the criteria setting forth convenience of location and maximum usage of equipment, it was necessary to undertake a population and motor vehicle distribution analysis.

The greatest proportion of registered motor vehicles is made up of automobiles. Of the five political subdivisions having the greatest number of motor vehicles (including Baltimore City), the automobile accounts for over 80 percent of all registered motor vehicles, with Montgomery County approaching 90 percent. This relationship of automobiles has been fairly consistent in the top ranking counties and Baltimore City throughout the 60's. None of these counties have had less then an 80 percent representation of automobiles to total registration.

There has been a slight decline in the proportionate representation of automobiles to total registration and a slight increase of motorcycles and trucks and buses, especially in the less urbanized counties. Motorcycles have increased proportionately only one percent or less, while trucks have remained at less than 20 percent for the most populated counties (less than 10 percent of the total in Montgomery and Prince Georges Counties). The suburban-rural counties have proportionately 25 to over 30 percent of the total motor vehicle registration made up of trucks and buses. As an example, Caroline County has the highest proportion of trucks and buses with approximately 31 percent of the total registration.

Between 1960 and 1970, all counties showed a proportionate decline in the percentage of passenger cars to the total number of registered motor vehicles. This is not to say that there was a decline in the growth of automobiles; the contrary was true. Generally, the greatest proportionate increase of trucks and buses, motorcycles, etc., was experienced in the suburban and rural counties over the same time period.

It is anticipated that the proportionate make-up of motor vehicles will remain essentially the same in 1980 as in 1970 for all the counties in Maryland. The tendency will be for the metropolitan counties to increase significantly in all categories with the greatest proportionate increase remaining with automobiles. The suburban and rural counties will witness a continued proportionately greater increase in trucks and buses, motorcycles, and other vehicles over automobiles.

4

PMVI SYSTEMS: A COMPARISON

STATE LICENSED INSPECTION SYSTEM

Description

Under a state licensed inspection system, the state appoints garages or service stations to perform the inspection of motor vehicles. The designation of official inspection centers usually follows the filing of an application with the agency responsible for supervision of the program. In most cases, the Motor Vehicle Administration, the State Police, or a Public Safety Department has charge of this matter. Each applicant is investigated to determine whether his business meets space, manpower, and equipment requirements. Certification will sometimes involve an oral examination, the purpose of which is to assure that the garage or service station owner understands the responsibilities entailed in the program, and to determine whether his employees are qualified to carry out the inspection procedures as established under state law.

Since 1926, twenty-nine states have enacted laws that require periodic inspection of motor vehicles in this manner. While these jurisdictions generally use the procedures indicated above to establish facilities needed for a state-wide program, "administration, inspection, and enforcement differs.....depending upon legislation as developed by the individual states....utilizing this type of inspection system."[1] The Automotive Industries Division of the Highway Users Federation for Safety and Mobility cites the following differences among the twenty-nine states:[2]

1. The number of inspections that a vehicle must undergo per year varies from one to two.
2. Most states perform inspections year-round, but a few specify particular months as periods in which the service is performed.
3. Fees charged to the motorist range from $1.00 to $3.50.

The inspection procedure itself is specified by the state. Once a vehicle passes the required test, stickers to be placed on the windshield are issued by the station. Colors and sizes are varied by inspection periods to aid law enforcement officers in noticing vehicles that have failed to satisfy inspection. If a vehicle is found to be unsafe, repairs are required within a designated period of time and the vehicle is to be submitted for reinspection before a sticker is issued. It should be noted that:

> "these private, licensed stations function as the service facility for the State administering the vehicle inspection program. No enforcement authority is delegated to the inspecting stations. Only law enforcement agencies have the authority to prohibit operation of a vehicle which does not meet inspection standards on the public streets and highways."[3]

To make sure that individual garage and service station owners follow these procedures, the supervising agency makes periodic inspections of the facilities and their operations. If facts are discovered that lead officials to believe that unsafe vehicles are being passed or that dishonest stations are suggesting unnecessary repairs, state enabling legislation usually permits the revocation or suspension of the station's license.

Generally, states with large geographic areas and dispersed population, have adopted this system. Citizens are within close driving distance to inspection stations where inspection and repairs are made. Since no statute places a limit upon the number of stations that may be licensed, it is conceivable that every area in a state will have more than adequate facilities with which to carry out inspections.

The costs entailed in the supervision of these private stations are usually covered by the state's income from the sale of the stickers and/or official inspection signs to the authorized stations. Few states, however, are satisfied that their inspection of garages and stations is adequate at the present time.

State Experience: Massachusetts

In 1926, the first compulsory periodic motor vehicle inspection law in the United States was enacted by the State of Massachusetts. By 1930, the system was completely organized and required annual inspections to be made at licensed stations within a fifteen-day period after the vehicle had been registered. After five years, it was felt that enforcement was a complete failure and that one inspection

1. AAA Foundation for Traffic Safety, A Study of Motor Vehicle Inspection, April, 1967, p. 9.
2. "Vehicle Inspection States," January, 1971.
3. Highway Traffic Safety Center of the Michigan State University, "Study Report and Plan for Periodic Vehicle Inspection for Michigan," December, 1964, p. 7.

per year was inadequate. Thereafter, two required inspections were concentrated into two separate one-month periods, one in May and one in September, later changed to April and October. According to State officials:

> "... this system of concentrating on two short periods of one month each, secured far better results in sustaining public interest, obtaining compliance with the law, and maintaining safety equipment in reasonably good condition. No trouble is now experienced in attaining inspection of practically 100% of the motor vehicles registered...(A)n intensive road campaign is carried on, after the inspection period is ended, by motor vehicle inspectors and state and local police. All owners or operators of cars which do not display a sticker are prosecuted in court, and as a result, within a few days after the inspection period is over, there are few cars in Massachusetts which have not been inspected..."[4]

The licensed stations operate throughout the year for the purpose of inspecting second hand cars registered between inspection periods, and for correcting equipment defects reported by inspectors or police.

Currently about 3100 stations are licensed by the State to inspect over 2.5 million vehicles per year, this service costing the individual motorist $1.00. About forty people are sent into the field to make continous inspections of station equipment, follow up complaints, report on cars with stickers that are actually in unsafe condition, and, about the middle of each inspection month, place reminder cards under the windshield wipers of cars not yet inspected for the purpose of stimulating the inspections to reduce a last minute rush to the stations. In addition, unsafe vehicles, with or without stickers are tagged; if the owner of the vehicle does not follow up this official notice within a specified period of time, his registration is suspended without further notification.

Although these tasks entail a great deal of time, Massachusetts feels that their work force is adequate for the job. It is interesting to note in this regard, that the State found it necessary to consolidate inspection periods in order to facilitate supervision. Estimated cost for the administration of the program was $300,000 in 1964.

OTHER ALTERNATIVE SYSTEMS LICENSED BY THE STATE

Fleet Inspection

The problem of inspecting large fleets of motor vehicles has been handled in two approaches. The first approach requires all fleet owners to submit their vehicles for periodic inspection in the same manner as would any individual to the normal inspection procedures. In the District of Columbia, for example, Hertz Rent-a-Car, and the Potomac Electric Power Company, both fleet owners with many operating vehicles, have maintenance schedules to follow which include periodic inspection through the District inspection lanes.

The second approach to fleet inspection is to license the fleet owners to inspect their own vehicles. This accommodates the large fleet owners who would have a difficult task of presenting all their vehicles for inspection at State or private stations.

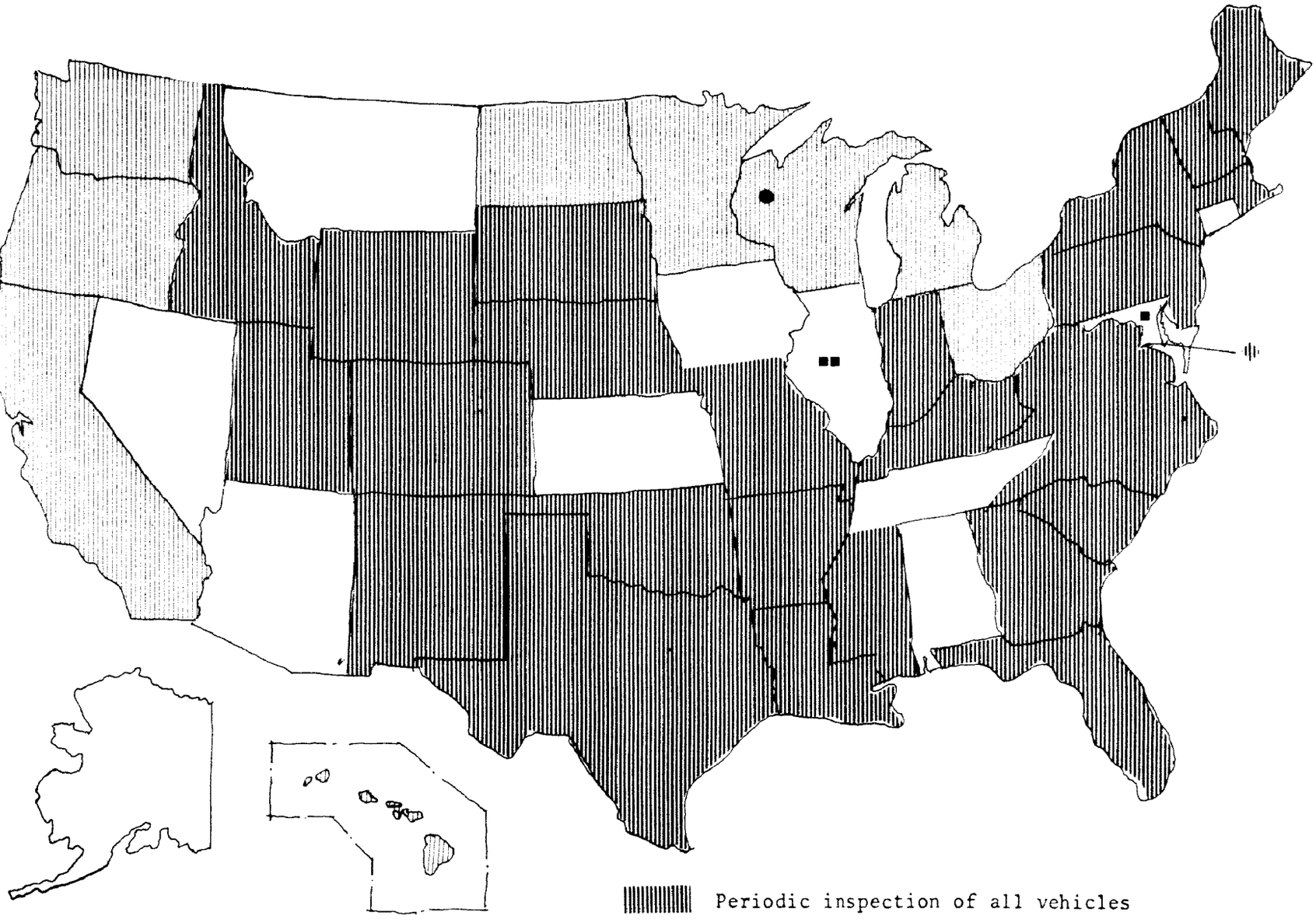
The State of Ohio has used this second approach to fleet inspection for the past three years. Their fleet inspection law is as follows:

> "Section 4513.02 (D) every person, firm, association, or corporation which, in the conduct of its business, owns and operates not less than fifteen motor vehicles in this State and which, for the purpose of storing, repairing, maintaining, and servicing such motor vehicles, equips and operates one or more service departments within this State, may file with the Superintendent of the State Highway Patrol, applications for permits for such service departments as official inspection stations for its own motor vehicles. Upon receiving an application for each such service department, and after determining that it is properly equipped and has competent personnel to perform the inspections referred to in this section, the Superintendent shall issue the necessary inspection stickers and permit to operate as an official inspection station. Any such person who has had one or more service departments so designated as official inspection

4. T.F. Creedon, for the Automobile Manufacturers Association, Inc., Motor Vehicle Inspection: Comparative Study between State Approved and State Operated Inspection Stations, July, 1963, p. 76.

MOTOR VEHICLE INSPECTION STATES

FIGURE 4.1



January, 1971.

FIGURE 4.2 STATES REQUIRING PERIODIC INSPECTION OF ALL VEHICLES

(As of January 1, 1971)

Systems in which inspection stations are state-operated are indicated by (SO). In others, inspection stations are state-appointed and supervised.

STATE	LAW ENACTED	PROGRAM STARTED	ADMINISTERED BY	INSPEC. PER YR.	INSPECTIONS PERFORMED*	INSPECTION FEE**		
						Cost to Motorist	Charge for Stickers	Net to Station
ARKANSAS	1967	1969	State Police	1	Year round	$1.75***	50¢	$1.25
COLORADO	1935	1936	Revenue Dept.	2	Year round	1.50	10¢	1.40
DELAWARE (SO)	1933	1933	DMV	1	Year round	N/C****	--	--
DISTRICT OF COLUMBIA (SO)	1938	1939	DMV	1	Year round	3.00	--	--
FLORIDA*****	1967	1968 (June)	Public Safety	1	Year round	3.00	40¢	2.60
GEORGIA	1963	1965	Public Safety	1	Jan.-June	3.00	25¢	2.75
HAWAII		1961	County Police	1 or 2	Year round	2.00	25¢	1.75
IDAHO	1967	1968	Law Enf. Dept.	1	Year round	2.00	50¢	1.50
INDIANA	1967	1969	Traffic Safety & Vehicle Inspec. Dept.	1	Year round	2.50	50¢	2.00
KENTUCKY	1966	1968	Public Safety	1	Year round	2.00	25¢	1.75
LOUISIANA	1960	1961	State Police	1	Year round	1.25	25¢	1.00
MAINE	1930	1930	State Police	2	Year round	1.00	10¢	.90
MASSACHUSETTS	1926	1930	DMV	2	4/1-5/15; 9/1-10/15	1.00	N/C	1.00
MISSISSIPPI	1960	1961	Public Safety	1	Jan.-March	1.25	25¢	1.00
MISSOURI	1967	1969	Hwy. Patrol	1	Year round	2.50	50¢	2.00
NEBRASKA	1967	1969 (March)	DMV	1	Year round	2.00	25¢	1.75
NEW HAMPSHIRE	1930	1931	Public Safety	2	Year round	3.50° average	15¢	3.35° average
NEW JERSEY (SO)	1936	1938	DMV	1	Year round	1.00	--	--

FIGURE 4.2 STATES REQUIRING PERIODIC INSPECTION OF ALL VEHICLES

(As of January 1, 1971)

Systems in which inspection stations are state-operated are indicated by (SO). In others, inspection stations are state-appointed and supervised.

STATE	LAW ENACTED	PROGRAM STARTED	ADMINISTERED BY	INSPEC. PER YR.	INSPECTIONS PERFORMED*	INSPECTION FEE**		
						Cost to Motorist	Charge for Stickers	Net to Station
NEW MEXICO	1937	1959	DMV	2	Alternating months, Feb.-Dec.	1.00	10¢	.90
NEW YORK	1954	1957	DMV	1	Year round	3.00	25¢	2.75
NO. CAROLINA	1965	1966	DMV	1	Year round	2.25	25¢	2.00
OKLAHOMA	1967	1969	Public Safety	1	Year round	2.00	50¢	1.50
PENNSYLVANIA	1928	1929	Revenue Dept.	2	Quarterly Periods	3.50° average	15¢	3.35° average
RHODE ISLAND	1958	1959	DMV	1	4/14-7/1	1.00	10¢	.90
SO. CAROLINA	1967	1969	Hwy. Dept.	1	Year round	1.75	25¢	1.50
SOUTH DAKOTA	1967	1968	Motor Patrol	1	Year round	3.00	25¢	2.75
TEXAS	1951	1951	Public Safety	1	Year round	2.00	50¢	1.50
UTAH	1936	1936	State Police	1	Year round	2.25	25¢	2.00
VERMONT	1935	1936	DMV	2	May & Oct.	1.00	--	1.00
VIRGINIA	1932	1932	State Police	2	Year round	2.00	--	2.00
WEST VIRGINIA	1953	1955	Public Safety	1	Year round	3.50	50¢	3.00
WYOMING	1967	1967 (Oct.)	Revenue Dept.	1	Year round	2.00	25¢	1.75

*Most states designate which month vehicle is to be inspected based on date of purchase, license tag digits, or other. Some states, as indicated, limit inspections to certain periods of the year.

**In several states inspection stations pay an annual licensing fee besides purchasing stickers.

***Up to $17.50 for vehicles over 8,000 pounds gross weight.

****Included in registration fee.

*****Combined system: stations are state-appointed or county-operated under state supervision.

°Specific fee not established by law.

stations may have his motor vehicles, excepting private passenger cars owned by him or his employees, inspected at such service department; and any motor vehicle bearing a valid certificate of inspection issued by such service department, shall be exempt from the tests provided in division (B) of this section."

For truck inspection, this fleet program is most advantageous to the owners who must also comply with other state requirements, i.e., Interstate Safety standards which normally require more rigorous testing. Moreover, the "lane" inspection of large trucks and other heavy vehicles requires special equipment to do an adequate job of inspection. In a state licensed system, fleet inspection of trucks would be a necessity.

With a state fleet inspection program, the state would still require supervisory personnel to make periodic checks on fleet owners to insure that procedures and standards were followed. An appropriate fee might be charged to cover the administrative costs to the state.

Private Contract for PMVI

Several private organizations offer periodic motor vehicle inspection program services to the state on a contract basis. Their proposals normally include the construction, equipment implementation, and operation of inspection stations in accordance with National Highway Safety Bureau and state standards. The contract arrangements are for either 5-or 10-year leases accompanied by provisions for ownership of buildings and equipment by the state at the expiration of the lease. The contracted organization provides their own managerial manpower and necessary training for inspection personnel hired from the area. Liason coordination for communication purposes between state authorities and the inspection stations is also furnished.

Ordinarily, the state must provide suitable sites clear of manmade structures; permits and licenses for construction; empowering legislation to permit issuance of a contract of periodic motor vehicle inspection services and the parameters for tests to be performed. Program supervision and monitoring of contract services must also be provided by the state.

The private organization retains a percentage of the inspection fee for its services and submits the remainder to the State. This method of instituting a PMVI program is adaptable to a state that is not financially capable or willing to invest in facilities, but nevertheless wants to embark upon a PMVI program. With this alternative, the contracted organization makes all the initial capital investments while requiring provisions in the contract to guarantee them the full recovery of their initial outlay.

The Government Services branch of the RCA Service Company made such a proposal to Maryland several years ago. Presently, Arizona, which has no periodic motor vehicle inspection program, has shown the most interest in the private contract arrangement, although no state has yet adopted such a system. The most difficult obstacle to implementation of the contract system is obtaining the proper empowering legislation to permit issuance of the five- or ten-year contract.

STATE OWNED AND OPERATED INSPECTION SYSTEM

Description

Under a state owned and operated system, the state government assumes complete responsibility for the functioning of the program. All inspections are carried out by civil service personnel who are trained by the state and work in stations that are owned or leased by the state.

> "The items inspected are generally the same as those in the state appointed system, however, the equipment used for inspection purposes is sometimes different, due to the difference in the basic function and layout of the facility where the inspection is being performed."[5]

This set-up permits the stations to "operate on an 'assembly line' basis with several inspectors each doing a portion of the inspection as the vehicle passes through the lane."[6] Quick and accurate examination is facilitated by the use of personnel who perform specific acts repetitively with specialized equipment, usually requiring a matter of minutes

5. Op. Cit., AAA Study, p. 10.

6. Op. Cit., Michigan State University, "Vehicle Inspection for Michigan," p. 5.

for complete inspection. Examination of vehicles is the only interest of these stations. All repairs or adjustments that are required must be made elsewhere, followed by the return of the vehicle for re-inspection. Windshield stickers, similar to those used under the state licensed system, are given to each car that passes inspection.

While this system does entail an initially high cost outlay for installations and the continuing costs for large numbers of personnel to run the program, a state owned and operated system enables those involved to attain a high degree of uniformity of inspection. Simplified control over the entire operation is assured along with an unbiased staff to perform the examinations and collect data in an efficient manner. This system has been found most useful to densely populated states of small geographic area where centers may be used to capacity throughout most of the year. Optimum usage and future expansion can be planned in advance since inspection buildings can be built to correspond with the density of current and projected car registrations in specific localities.

For these reasons, New Jersey, Delaware, and the District of Columbia enacted legislation during the 1930's to establish state owned and operated inspection systems. All three require one inspection and perform them year-round under the supervision of their respective Motor Vehicle Departments. Delaware includes a charge for the service within their registration fee, while New Jersey collects $1.00 and the District of Columbia $3.00 per inspection.

State Experience: New Jersey

Established in 1938, New Jersey's inspection system is the largest state owned and operated program in the country to date. Their PMVI statute, enacted in 1936, has resulted in the building of forty-one inspection centers with a total of seventy lanes (24 centers having one lane, 7 having two lanes, 8 having three lanes, and only 2 having four lanes). With a capacity to examine an estimated 7.75 million vehicles per year (assuming 40 vehicles/lane-hour), department officials calculate that in 1969, 5,659,076 inspections were performed on approximately 3.7 million vehicles.

When considering the feasibility of state owned and operated motor vehicle inspection systems, questions frequently arise concerning the convenience of such a program to the motor vehicle owner and operator. The New Jersey experience is particularly helpful in this regard in developing reasonable guidelines for the determination of the location and size of the stations to be built--both factors having an impact on the time a motor vehicle owner must spend to have his car inspected. According to a study completed in June, 1970, by a private consulting firm, geographic distribution of the stations "corresponds to a driving distance of approximately thirty miles. This distance occurs only in a sparsely populated area, however, and few people have to drive more than twenty miles to reach a station."[7] The feeling of the general public that the inspection system is reliable and effective seems to outweigh any inconvenience that this traveling distance might create.

An examination of the work load factors for each station and the resulting waiting time for inspection revealed that while existing facilities were more than adequate, a problem does arise from an unequal but unavoidable distribution of the work load. It was found that 91% utilization of the facility entailed a fifteen-minute wait per car, and that ten stations worked over this rate. However:

> "A positive correlation between load factor and inspection quality was found, i.e., stations operating at high load factors scored significantly higher in the inspection quality audit than did stations operating at low load factors."[8]

Thus, if greater efficiency and quality is desired, it may be necessary to increase the waiting time per vehicle. It has also been suggested that daily scheduling of automobiles and weekly or monthly scheduling of trucks would alleviate the build-up of cars that occurs at the end of each month and at the end of each year.

Additional problems have been cited in both the area of state intra-departmental cooperation and in the lack of power to carry out the extensive responsibilities involved in PMVI. The former criticism centers on the fact that registration precedes inspection, permitting unsafe vehicles to be sold and registered. The usage of 48-hour rejection stickers issued for

7. Operations Research, Inc., An Evaluation of the New Jersey Motor Vehicle Inspection System, (prepared for the Division of Motor Vehicles, Department of Law and Public Safety), 1970, p. 35.

8. Ibid., p. 10.

vehicles exhibiting extraordinarily hazardous defects has also been noted as a procedure that seems to be inconsistent with the PMVI objective of assuring that vehicles in operation are in safe mechanical condition. Authority to impound such vehicles might help station supervisors to carry out their responsibilities in a more efficient manner.

State Experience: Delaware

The State of Delaware has had a motor vehicle inspection system operated by the State since 1933. Prior to 1940, when Delaware built its first permanent station, mobile equipment was used to inspect motor vehicles at publicly announced locations on a regular schedule. Presently, Delaware has an inspection station in each of their three counties in addition to a fourth station near Wilmington, a large population density area. These four stations, three of which have two lanes each and one with four lanes, service a motor vehicle population of approximately 332,000 vehicles which almost equals the number of vehicle registrations. Just within the past year, Delaware's inspection procedures and standards have been updated with the current Inspection Handbook issued by the Automobile Manufacturers Association.[9]

The Delaware inspection lane layout and equipment is similar to that in the District of Columbia. However, their procedures differ in that normally vehicles are not lifted for front end inspection except in two cases: (1) if the vehicle is visually defective, a full under body inspection is made, (2) all school buses are lifted for inspection.

The Delaware inspection system is unique because their vehicle registration, driver licensing, and motor vehicle inspection are consolidated within one operating facility. With this physical arrangement, an individual can be serviced for several different functions.[10] The costs for an annual inspection are included in the $20 vehicle registration fee. The overall annual costs for operating Delaware's motor vehicle program is approximately one and a half million dollars which is more than adequately covered by the annual registration fee.

The State has recently opened a new station at Dover, Delaware, which includes all of the above mentioned services and an offstreet driver testing area. Delaware officials commented that the queuing areas for inspection may not be sufficient in their new station. Other problems which they have encountered include heating of the lanes during the winter months (the lanes tend to become wind tunnels), and inadequate building entrance protection from driving rains.

At the Delaware Highway Administration building in Dover, a computer center handles all motor vehicle information as well as other State services. The computer bank keeps a complete updated file on all motor vehicles registered in the State. Several console units are available to the Main Office and the highway patrol to facilitate quick access to records. Delaware hopes to include in the future a console at each inspection station to identify vehicles presented for inspection and to update the computer bank after each inspection. For ease of identification, the individual's registration number and license tag number are identical. Access to records can be obtained by tag number or last name of the owner.

Delaware has a fleet inspection law which allows any fleet owner with fifteen or more vehicles to apply to the State for a license to inspect them. When application is made, the State sends an inspector out to approve the fleet owner's facilities.

OTHER ALTERNATIVE SYSTEMS OPERATED BY THE STATE

Random Inspection

Eight states currently employ a method of roadside contact and inspection to assure the safety of automobiles in their jurisdictions. Cars are selected on a random basis to stop for inspection wherever tests are being conducted, with inspection locations frequently changed. For this reason, an individual never knows when he will be stopped; it is felt that this fact will assure year round owner concern for vehicle maintenance rather than once or twice a year before mandatory periodic checks. Washington, Oregon, North Dakota, Minnesota, Wisconsin, Michigan, Ohio, and

9. Vehicle Inspection Handbook for Passenger Cars and Station Wagons, Trucks and Buses, Motorcycles, School Buses, and Foreign Vehicles, through 1969 Models, prepared by Automobile Manufacturers Association in cooperation with the American Association of Motor Vehicle Administrators, Jan., 1969.

10. See State Multi-Service Center section in this report for a discussion of the advantages of this arrangement.

California also cite the saving to each owner (as no fee is charged for the inspection), and to the state (as less men are required to handle the inspections than under a state-owned or -licensed system.) State Highway Patrols usually administer such programs.

While the effectiveness of a random inspection system has not yet been fully determined, the experience of California and Ohio may be helpful in evaluating this alternative.

> --California passed a bill in 1965 that established a random spot-check inspection program. A pilot version that ran from August, 1966 to December, 1966, inspected 48,000 cars. By July, 1967, the permanent program was established that involved 300 men in 60 locations working within cities and in unincorporated areas. Five-man teams check equipment, safe mechanical condition, and compliance with the motor vehicle pollution law, with examinations averaging five minutes in length.
>
> > "No dismantling of the vehicle or removal of parts is done by an inspection team. Items checked are mirrors, horn, windshield wipers, glass and glazing, wheels and tires, mufflers and exhaust systems, service and parking brakes, steering, lights, and smog control devices. The inspection process also includes a driver's license and registration check."[11]
>
> In addition, commercial vehicles are inspected both on the highway and in fleet terminals, and all vehicles stopped for any traffic violation are subject to a brief external inspection. Those drivers who ignore written repair warnings and don't give proof of corrections made either at a Patrol Office or an inspection lane may face court action.
>
> The California Highway Patrol estimates that 1.6 million cars (16% of the registered cars) are inspected per year with an additional 2.5 million given repair warnings after being stopped for a violation.[12] State officials cite their large and widely dispersed population of close to 12 million cars as the basic reason for initiating a random system; supervision of a state owned or appointed program would run at least $50 million at the outset while their random system costs about $4.5 million per year to the State.[13]
>
> --Ohio's system went into effect January, 1968. Again, cost and manpower demands seem to have been decisive factors in choosing this system. Rather than hire an estimated 150 inspectors to supervise examination of the close to 5 million registered vehicles under a licensed system, a random program using about 30 officials was selected. According to the State Highway Patrol, almost 20% of the registered vehicles are stopped for inspection each year. It is Ohio's feeling that this system makes most effective use of manpower involved as "time and effort would not be consumed on new and obviously safe vehicles." This assumption, however, is highly questionable in light of recent findings made by those investigating the automotive industry, and should lead one to re-examine this built-in bias of the random system in terms of its impact on safety.

The random system appears to be a satisfactory option as an appropriate program for very large states with dispersed populations which face other financial burdens and difficult enforcement problems. Evidence to date, suggests that the random system would serve best as a check on efficiency of a PMVI program rather than as a substitute for it.

Mobile Inspection Systems

For areas with low population densities, in which permanent inspection stations are not economically feasible, mobile motor vehicle inspection facilities have been developed. States will now be able to close critical gaps in their inspection programs through the use of mobile stations that "could inspect all the cars within a 50 mile radius in a few

11. "California Highway Patrolman," Volume 31, No. 1, March, 1967, p. 9.

12. H.A. Duryea, "A Report: Random Motor Vehicle Inspection in California," as printed in the Traffic Digest and Review, May, 1968, p. 5.

13. Ibid.

days, then move to another area."[14] Such inspection units have been built by the RCA Service Company under a study grant from the National Highway Traffic Safety Administration (NHSTA) of the Department of Transportation (DOT). "Although no states have any formal plans for utilizing the mobile unit device, Puerto Rico, which began a PMVI program in July, 1970 is considering it."[15]

The facility is self-contained, can operate in any location (including asphalt, concrete, or hard-packed surfaces), and can perform the following checks on:

1. cursory front end alignment;
2. headlight aim and intensity;
3. front suspension and steering integrity;
4. brake dynamic performance.

A demonstration phase also includes inspection of exhaust systems, engine belts, tires and wheels, glass, and windshield wipers. In order to carry out these tests a plate-type side slip indicator, a headlight tester, a front-end lift, and a dynamic brake analyzer are used.

When operated with a five-man crew and one supervisor, the equipment can be unloaded and set-up in 40 minutes. Capacity is fifteen vehicles per hour, with each individual operation running approximately 16 minutes. Based on this rate, cost per vehicle would run $2.46 (including all capitalization and operating costs). The overall cost of this facility was $44,527.

The efforts of the United States Postal Service should also be noted in a review of available mobile inspection units. Resulting from two years of research, their device focuses on the testing of exhaust emissions. The set-up is housed in a 40-foot trailer, and uses gas analysis data processing equipment and diagnostic tools to simulate actual driving conditions. Five-minute examinations are conducted in which exhaust emissions, created at different vehicle operating speeds, are analyzed by electro-optical analysis devices. The laboratory technicians are capable of making minor equipment adjustments, but if major deficiencies are found, the vehicle is sent to garage facilities of the Post Office for the necessary repairs. At present, the mobile unit is undergoing a three-month pilot testing program in Maryland, Virginia and West Virginia during which 2,000 postal vehicles will be inspected. Postal Officials claim that "in addition to reducing air pollution to acceptable levels, the system is expected to improve operational efficiency of postal vehicles and to provide significant decreases in maintenance costs."

The largest disadvantage of the mobile unit is its dependence on weather conditions. Because it is mobile, the unit can only be operated efficiently when the weather is favorable to outside inspections. Once the temperature becomes too cold, the inspection operations are not as effective and consistent in results as is desirable. In addition, the management of the mobile units requires considerably more coordination and publicity in order to notify the citizens in the area that the mobile facility is open for operation. If a citizen misses an inspection, he may have to drive a considerable distance to secure his annual inspection.

14. "NHSB Unveils Mobile Inspection Facility," The Federal Reporter, October, 1970, p. 6.

15. Ibid.

INSPECTION SYSTEM COMPARISON

State Owned vs. State Appointed System

Both state owned and operated, and state appointed inspection systems have recognizable advantages and disadvantages.

State Licensed Private Garage Inspection

Advantages

Convenience to motorists because of accessibility of stations -- less travel and waiting time.
Repairs can be made at the same time vehicle is inspected.
Systems may be quickly and easily organized with little cost to the State.

Disadvantages

Lack of uniformity; degree of inspection varies. Equipment is less sophisticated, often inadequate.
Inspection charges vary.
Lack of public confidence in the honesty of some garages.
Close supervision by the State is required.

State Owned Inspection

Advantages

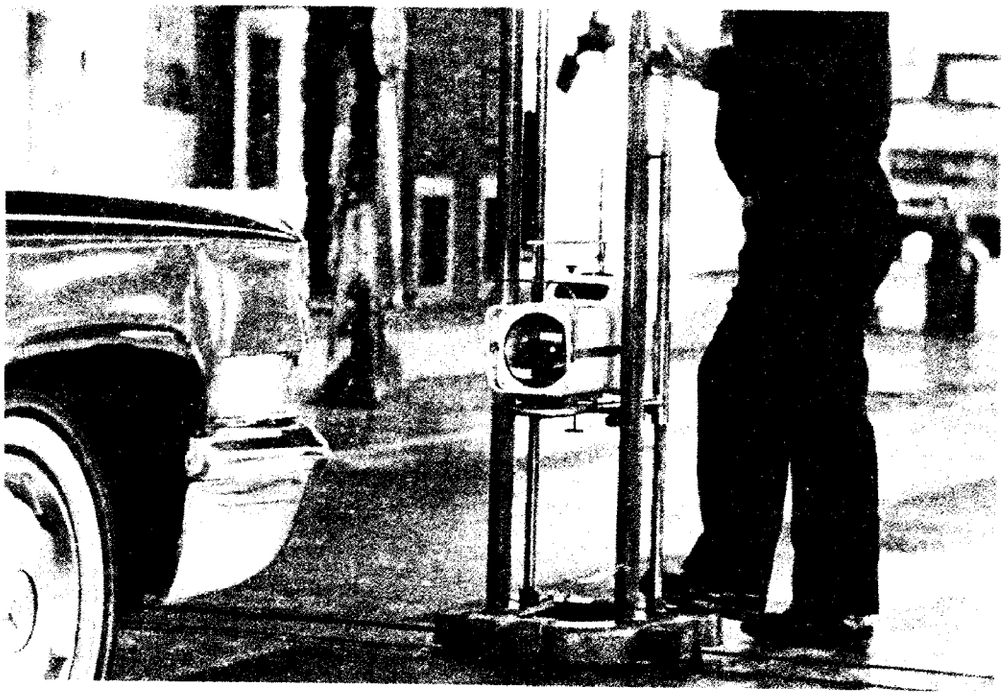
Uniformity of inspection.
Stricter, more effective control over inspectors.
Impartiality of inspectors who have no monetary interest at stake.
Fixed minimum charge for inspection.
More accurate and complete collection of data.
Provides opportunities for other official activities relating to motorists.

Disadvantages

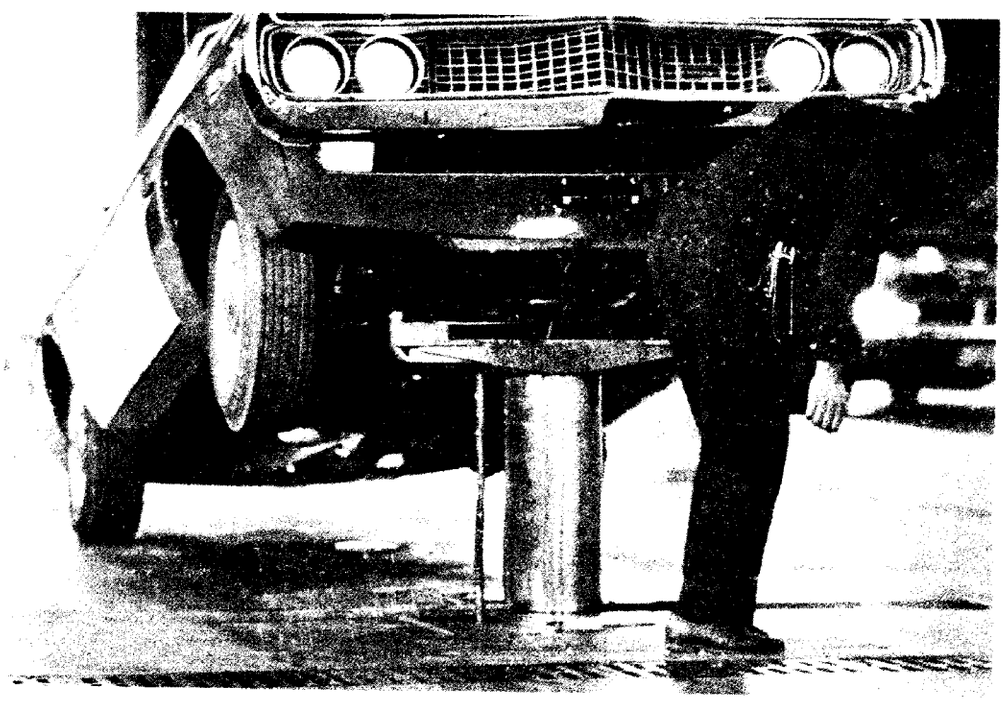
Incovenience due to small number of stations; increased driving and waiting time.
Repairs must be made elsewhere and vehicles returned for inspection.
Lengthy implementation time.
Large initial cost outlays for stations and equipment.
Large force of inspectors must be trained.

A 40 foot van houses a prototype mobile inspection unit.

A prototype mobile lane inspects a motor vehicle every 15 minutes.



All vehicles undergo a headlight test in the inspection lane.



A motor vehicle is inspected for safe underbody structure.


VEHICLE SAFETY RESEARCH
SPECIALIZED TEST LANE
THIS SPECIAL PROJECT IS A JOINT EFFORT
OF THE DISTRICT OF COLUMBIA

5
DIAGNOSTIC TESTING

INTRODUCTION

The concept of a "diagnostic inspection system" is simply an organized method of testing, checking, and analyzing every safety and performance factor of a motor vehicle by tests conducted with the most sophisticated equipment available. In comparison with a traditional inspection procedure, the diagnostic system employs the use of dynamic equipment and testing in lieu of tests performed under static conditions.

The common practice today of inspecting a stationary vehicle under static conditions will produce results that can only partially predict what the vehicle's safety performance will be at high speeds on the highway. As travel increases on high-speed highways, the need for certifying the road-worthiness of the vehicles traveling these roads also increases. Correspondingly, inspection procedures must change from the simple unreliable visual inspections to meaningful dynamic testing procedures consistent with characteristics of modern high-speed driving.

This dynamic testing affords greater analysis and evaluation under "real" conditions, of safety and performance systems of the motor vehicle. For example, the brakes are tested on a dynamic brake tester with the wheels of one axle positioned on a set of powered rollers. The rollers are brought up to a speed such that the car wheels are turning at approximately 45 miles an hour. The diagnostic technician seated in the car applies its brakes several times, each time with successively greater pedal pressures. With each brake application the retarding force produced at each wheel is measured. It is expected that the brakes together reach some retarding force level at each application and that they remain substantially in balance. The car is then repositioned on the rollers and the same tests performed on the other set of brakes.

A discerning diagnostician has learned a great deal in the course of these tests. He has seen symptoms of possible faults in wheel balance, wheel bearings, vehicle tracking, and other items besides brake function. He has seen the operation of the brakes at speed and how the heat they generate in service may affect them. His catalog of symptoms will direct him to an examination of those components to determine their serviceability. This process is designed to expose brake malfunctions by simulating operating conditions and then to determine that the brakes are in serviceable condition for future use.

In 1962, the first true diagnostic lane was opened by Mobil Repair Centers, Inc. Since this singular beginning, Mobil has expanded its operation to five such installations, located in strategic areas throughout the country. In the intervening years, five other major oil companies have opened diagnostic centers, as have many leading automobile dealers, major tire companies, and dealerships, and independent service shops. Some 40 such centers are now in operation.

Stanford University in a research report on the future of diagnostic centers predicts 15,000 major installations by 1975, and perhaps as many as 150,000 small diagnostic operations. These figures seem unbelievable, yet a number of major car and tire manufacturers, as well as oil companies, have already announced plans for more then 500 such facilities in the immediate future.

Moreover, the diagnostic center layout, modified to accommodate periodic motor vehicle inspection needs will produce a most comprehensive and attractive consumer appeal. The "diagnostic" results which are furnished to the motor vehicle owner will greatly encourage his adoption of preventive maintenance to avoid costly future repairs. There is no question that the trend had been established because of the need for restoring confidence in automobile service.

It is a generally accepted fact that the proper maintenance of a vehicle requires the expenditure of money. These costs can be, and in many instances are, greatly increased by money spent unnecessarily on repairs and spare parts because of improper diagnosis on the part of inspection and maintenance personnel. The concept of the diagnostic inspection center is to provide for scientific diagnosis of vehicle condition and performance with equipment which takes most of the "guess work" out of the inspection procedure.

A typical diagnostic inspection center conducts well over 100 individual tests on an automobile, many of which are directly related to the safety of its operation. In addition to the standard background information on the vehicle and driver, a typical diagnostic center check list has over 100 items grouped under four phases of the inspection. (See Figure 5.1) Each test is coded in three classifications standard ,

substandard, or critical. An item that checks out as substandard but which is being operated under favorable or ideal conditions may not warrant immediate adjustment or replacement. A part tested critical and one which would affect the safe operation of the vehicle might require immediate repair or replacement.

The most advanced research in future diagnostic procedures is being developed by the Volkswagon Corporation. VW has reduced the time requirement and the possibility of human error by combining sophisticated workshop equipment with sensing devices installed in the vehicle. The sensing devices are connected to an easily accessible central recepticle in the engine compartment which can be plugged in by means of an umbilical cord to recording equipment for precise readings. The functions tested include engine compression, battery condition, generator output, starter current draw, distributor dwell angle, oil temperature, and from separate sources, toe-in and camber. The VW Corporation will have installed this recepticle in most Volkswagon models by the end of May 1971.[1]

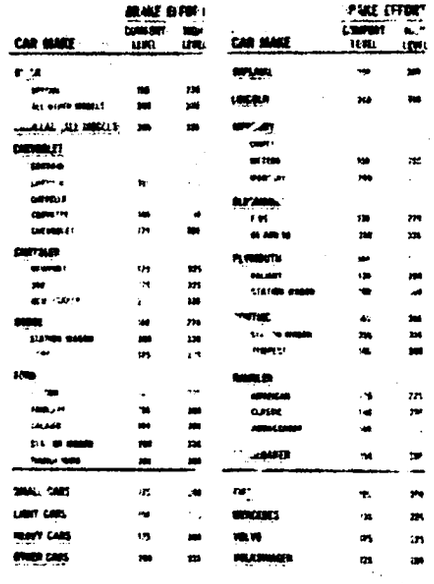
A prototype full diagnostic test designed for an off-line motor vehicle inspection stall would include the following equipment:

Combination dynomometer and dynamic brake tester (with brake analyzer gauge)
Exhaust emission instrument console
Headlight tester
Dynamic wheel aligner (with aligner instruments)
Diagnostic rack and hoist unit (with left and right spinners)

The average time required for inspection of a passenger vehicle in an adapted diagnostic inspection stall is 15 minutes, including the testing of brakes and steering at highway speeds. This time estimate under ideal operating conditions with well trained crews of five operators would result in 12 cars inspected every hour.

Maryland should consider implementing several full diagnostic off-line testing stalls in an inspection station to offer the public an objective, impartial evaluation of their automobiles. This pilot project could provide the answers to public interest in utilizing such a service. The full cost of the equipment and manpower would be apportioned to a reasonable fee paid by the motorists who desire this state service. At present, all diagnostic services are offered by private firms who usually have a direct economic interest in finding defects in the vehicle. This situation conceivably results in the impression among vehicle owners that the "set-up" is intended to generate profits for the owners rather than promote motor vehicle safety. If the state were to initiate a pilot project, the public would presumably be more ready to take advantage of the services offered.

The Senate overwhelmingly approved Senator Hart's bill, S-976, in November, 1971 to provide $50 million for diagnostic-center demonstration projects for the next 3 years. The grant system authorizes up to 90% Federal funding for state projects which test cars for safety performance, emission of pollutants and verification that repairs on defective vehicles have been properly performed. The house is expected to approve the bill early in the 1972 session.



1. For a further discussion of future diagnostic systems, see "Motor Vehicle Diagnostic Analysis Technology: 1971-85, "Technical Conference for the use of the Committee on Commerce, U.S. Senate, April 22, 1971.

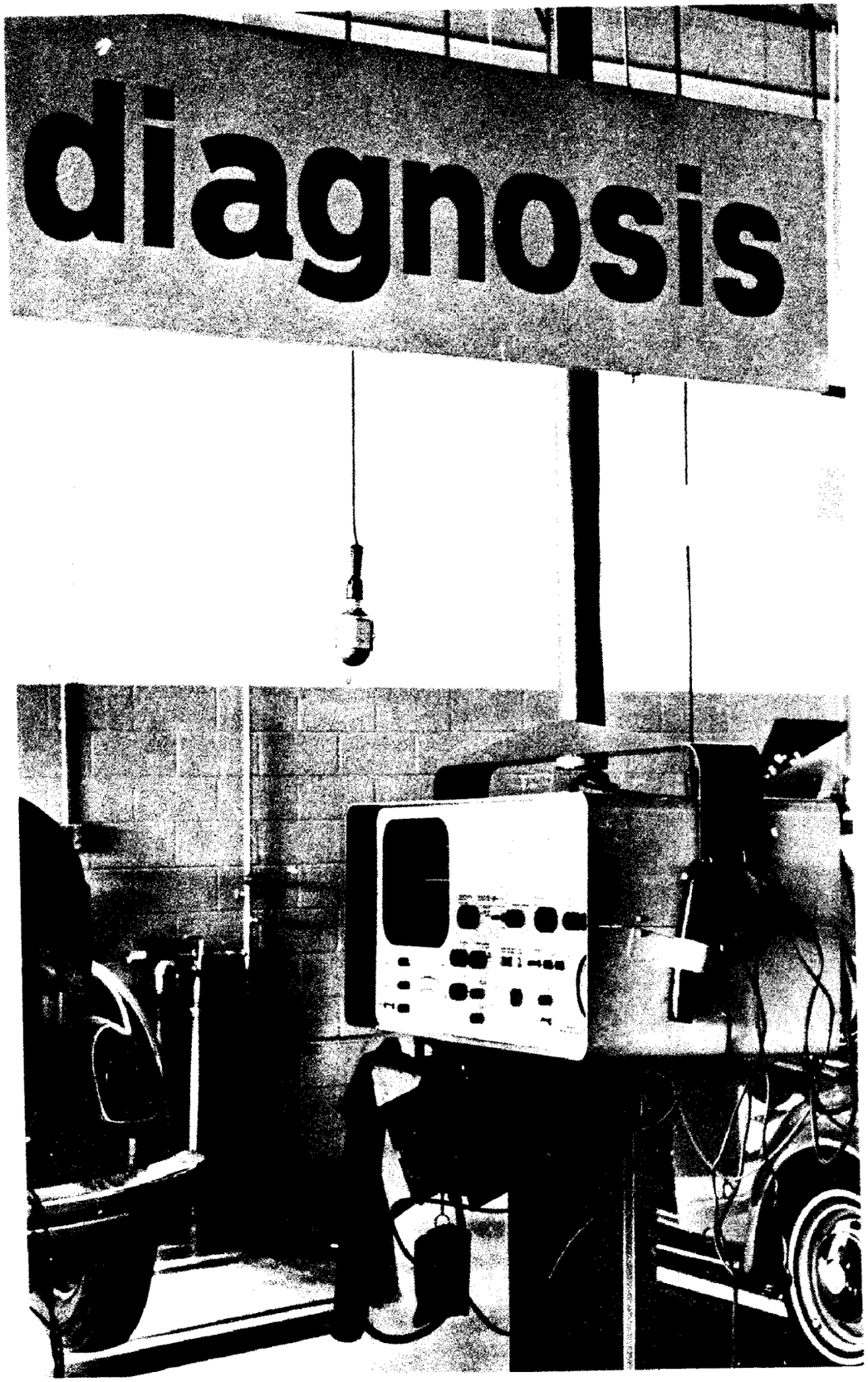
TYPICAL DIAGNOSTIC CHECKLIST

FIGURE 5.1

MAKE _____ YEAR _____ ENGINE CODE _____ MILEAGE _____

FORM CCI 103B

	GOOD	MARG.	FAIL		GOOD	MARG.	FAIL
1. REAR TIRE CONDITION				51. BRAKE PEDAL FADE			
2. INSIDE LIGHTS				52. BRAKE PEDAL RESERVE			
3. INSTRUMENT LIGHTS & GAUGES				53. REAR BRAKE EFFORT AT 45 M.P.H.			
4. FRONT SEAT OPERATION				54. REAR BRAKE UNBALANCE			
5. WIPER & WASHER OPERATION				55. REAR BRAKE FADE			
6. WINDSHIELD CONDITION				56. NO LOAD BATTERY VOLTAGE			
7. WINDOW GLASS CONDITION				57. BATTERY UNDER LOAD			
8. INSIDE & OUTSIDE MIRROR				58. POINT RESISTANCE			
9. SEAT BELT CONDITION				59. COIL PRIMARY RESISTANCE			
10. HORN OPERATION				60. BATTERY TO COIL RESISTANCE			
11. HEATER & DEFROSTER OPERATION				61. COIL SECONDARY RESISTANCE			
12. AIR CONDITIONER OPERATION				62. COIL POLARITY			
13. POWER WINDOW OPERATION				63. CONDENSER SERIES RESISTANCE			
14. PARKING BRAKE OPERATION				64. CONDENSER CAPACITY			
15. MASTER CYLINDER LEAKAGE				65. CONDENSER LEAKAGE			
16. WIPER BLADE & ARM CONDITION				66. AVAILABLE SECONDARY VOLTAGE			
17. HOOD AND LATCH OPERATION				67. PRIMARY RESISTANCE BYPASS			
18. TRANSMISSION FLUID LEVEL & CONDITION				68. SOLENOID CURRENT DRAW			
19. P. C. V. VALVE				69. STARTING CURRENT DRAW			
20. EXHAUST SMOKE				70. CHARGING CIRCUIT OUTPUT			
21. COOLANT LEVEL & CONDITION				71. REGULATED CHARGING VOLTAGE			
22. WATER PUMP CONDITION				72. MECHANICAL POINT ACTION			
23. COOLANT TEMPERATURE PROTECTION				73. ARCING POINTS			
24. POWER STEERING PUMP & HOSE CONDITION				74. DWELL ANGLE			
25. BELT(S) CONDITION & TENSION				75. DWELL VARIATION			
26. CARBURETOR & FUEL PUMP LEAKS				76. INITIAL TIMING			
27. BRAKE FLUID LEVEL				77. MECHANICAL ADVANCE			
28. POWER STEERING FLUID LEVEL				78. TOTAL ADVANCE			
29. ENGINE OIL LEVEL & CONDITION				79. DISTRIBUTOR CAP & ROTOR LEAKAGE			
30. RADIATOR CONDITION				80. DISTRIBUTOR ROTOR AIRGAP			
31. UPPER RADIATOR HOSE				81. SECONDARY VOLTAGE REQUIREMENT			
32. LOWER RADIATOR HOSE				82. PLUG WIRE CONDITION			
33. HEATER HOSES & CORE				83. PLUG FIRING TIME			
34. COOLANT LEAKS				84. CYLINDER BALANCE			
35. COOLING SYSTEM PRESSURE TEST				85. MANIFOLD VACUUM			
36. PRESSURE CAP CONDITION				86. A.F.R. EMISSION CONTROL			
37. AIR FILTER ELEMENT CONDITION				87. IDLE RPM			
38. CHOKE VALVE OPERATION				88. FUEL PUMP PRESSURE			
39. BATTERY VISUAL CONDITION				89. ACCELERATION PUMP OPERATION			
40. BATTERY CABLE CONDITION				90. CARBURETOR POWER VALVE OPERATION			
41. ELECTROLYTE LEVEL & SPECIFIC GRAVITY				91. THROTTLE LINKAGE			
42. PARKING LIGHTS				92. ENGINE CONDITION			
43. BRAKE LIGHTS				93. Rear Wheel Drive Speedometer Test at 30 MPH			
44. BACK UP LIGHTS				94. Rear Wheel Drive Speedometer Test at 60 MPH			
45. TAIL & TAG LIGHTS				95. DRIVE LINE BALANCE			
46. TURN SIGNALS				96. CLUTCH PEDAL FREE TRAVEL & OPERATION			
47. FRONT WHEEL SPEEDOMETER CHECK				97. Automatic Trans. Shift Pattern & Operation			
48. FRONT BRAKE EFFORT AT 45 M.P.H.				98. MAXIMUM ROAD HORSE POWER			
49. FRONT BRAKE UNBALANCE				99. WHEEL ALIGNMENT -- TOE IN			
50. FRONT BRAKE FADE				100. WHEEL ALIGNMENT -- R. CAMBER			


diagnosis

6

AUTOMOBILE EMISSION TESTING

INTRODUCTION

The objective of a State emission inspection program should be to reduce to a minimum level the emissions from internal combustion engines of mobile sources. The automobile accounts for 90% of the mobile polluters which the inspection program is designed to accomodate.[1]

Inefficient combustion and wasted fuel are the fundamental causes of automotive air pollution. Once it was realized that motor vehicles were a major source of pollution, steps were taken through governmental action and technological research. Over a period of years, these have been somewhat effective in reducing emissions.

The reduction of air pollution from automotive emissions would substantially reduce air pollution problems since they contribute more than 40% of the nation's total air pollutants by weight.[2] In addition, a state inspection program of monitoring and enforcement would result in noticeable benefits to the motorist. The periodic maintenance required to keep emission levels low will also result in reduced operating costs for the automobile owner.[3] These tangible benefits can be measured in terms of fuel economy, reduction in maintenance costs, and longer engine life.

Engine malfunctions which result in high emissions represent a loss of potential fuel energy that is normally converted to power in the engine. In one study,[4] the average motorist showed a savings of $21.45 per 10,000 miles in fuel economy compared to an average repair cost of only $16.50 to reduce exhaust emissions.

Automobile emissions come from three sources: the crankcase blowby, the tailpipe, and the general evaporative losses from the fuel tank and engine carburetor.[5]

Tailpipe exhaust makes up the major portion of emissions, contributing all of the carbon monoxide and oxides of nitrogen, and 60% of the hydrocarbons emitted from vehicles without pollution control systems.

An additional 20% of the hydrocarbon emissions (blowby) comes from the engine crankcase. These emissions are hydrocarbons in the form of raw gasoline which is blown by the piston rings into the crankcase and then vented into the atmosphere. Tightening of Federal standards in 1968 has resulted in effective control of this source of pollution.

The remaining 20% of hydrocarbon emissions enter the atmosphere by evaporation from the carburetor and fuel tank. Vehicles manufactured during and subsequent to the 1971 model year are equipped with evaporative emission control systems designed to eliminate most of this loss.[6]

Federal Legislation

The first piece of Federal legislation dealing with automobile air pollution was part of the Air Pollution Control Act of 1955 (P.L. 84-159). This Act provided temporary authority for research into all forms of air pollution and possible control methods. It was a Federal gesture to stimulate research in air pollution control. Then, in 1960, the Schenk Act (P.L. 86-493) directed the Surgeon General to make a two-year study of the effect of vehicle emissions on public health. This was made a permanent responsibility of the Surgeon General in 1962. In 1963, the Federal government took its first major step by enacting the Clean Air Act (P.L. 88-206). This Act replaced the 1955 Act and provided for grants to state and local governments for the establishment and development of air pollution control programs. The Secretary of Health, Education and Welfare was directed to develop devices and procedures for motor vehicle pollution control in concert with automotive and fuel industries and other interested parties. HEW was also required to report to Congress semi-annually on progress in abating automobile emissions. The history of this Federal entry into the control of auto emissions was one of passive encouragement to the states to begin research and development of pollution control programs.

1. Governmental Approaches to Automobile Air Pollution Control, Institute of Public Administration, March 1, 1971 (Prepared under EPA contract No. EHS 70-126).
2. Environmental Quality: The First Annual Report of the Council on Environmental Quality, August 1969, p. 62.
3. New Jersey/Clayton Key Mode Demonstration Project, Clayton Manufacturing Company, El Monte, Calif., April 1971.
4. Ibid., p. 23
5. State of New Jersey, Department of Environmental Protection, Notice of Public Hearing, May 27, 1971, p. 8.
6. Ibid., p.8.

The Federal Government set its first example in 1964 by requiring the General Services Administration to set vehicle standards similar to the California standards set in 1964, for vehicles purchased for Federal use. Only one year later, Congress passed the Motor Vehicle Air Pollution Control Act of 1965 (P.L. 89-272) which gave authority to HEW to set standards on all new motor vehicles. Prior to this legislation, the states (with the exception of California) had done very little about vehicle pollution. This act provided that sample prototype vehicles could be submitted to HEW by manufacturers on a voluntary basis for testing and certification. It called for complete control of crankcase hydrocarbon and carbon monoxide emissions on all new automobiles. The Act contained no specific mention of the power of the states to regulate emissions in hopes that Federal standards would promote uniformity. Therefore, although the 1965 statute was silent on the subject of Federal pre-emption of state regulation, one could have argued at the time that state regulation was to some extent limited by the authorization for Federal standards.

Some states proceeded to consider legislation on control of vehicle emission. The Federal Government responded to this initiative of the states by enacting the Air Quality Act of 1967 (P.L. 90-148). (Despite differing titles, all Air Quality legislation after 1963 constituted amendments to the Clean Air Act.) The 1967 Act provided national automobile emission standards and preempted the state adoption of more stringent standards for new automobiles (again with the exception of California.) It did, however, recognize the state's role in controlling emissions not covered by the Act and in the inspection of vehicles-in-use by providing Federal grants to states for emissions inspection programs. Further, it authorized research grants for the development of new fuels and unconventionally powered vehicles. It also gave HEW the authority to register fuel additives.

Finally, the Clean Air Act Amendments of 1970 (P.L. 91-604) established standards for emissions from new motor vehicles for 1975-76. These standards require a 90% reduction in emissions of carbon monoxide, hydrocarbons, and nitrogen oxides as compared with 1970-71 models. It further gave the Administrator of the Environmental Protection Agency (EPA) the authority to test representative samples of motor vehicles on the production line to assure that production line vehicles meet the same degree of emission control certified prior to production based on the prototype. It expanded the EPA authority to include the regulation, as well as the registration, of fuel additives. In addition, the new Act requires manufacturers to warrant the pollution control systems installed on the vehicles for five years or 50,000 miles. If a quick emission test procedure is developed, the Administrator has the authority to test individual vehicles on the production line or on the road to determine whether these vehicles continue to comply with the standards by which they were certified. If he found these vehicles to be out of conformity, he could require the manufacturer to recall the model or class for the purpose of correcting the nonconformity.

Approaches to Emission Control

Several approaches have been identified for controlling automotive emissions. They are summarized below:

(1) Testing of a prototype model by the manufacturer;
(2) Testing of new vehicles on the assembly line by the manufacturer;
(3) Testing of vehicles-in-use by the state;
(4) Promulgating state and Federal regulations to require periodic maintenance procedures by the vehicle owner.

The present approach to enforcing Federal standards is to require testing by the manufacturer of selected prototypes.[7] These prototypes are first driven to stabilize emissions, and then tested. The obvious advantage of this approach is that it places primary responsibility on the manufacturer to assure that the automobile performs to engineering and emission specifications. On the other hand, there are several disadvantages. The thrust of criticism focuses on the "laboratory conditions" under which the tests are made.[8] The prototypes are not built on the assembly line, but instead are specially built, expertly tuned under ideal conditions for emission test purposes only. Moreover, individual emission levels for the prototype models are not considered separately, but are averaged together for certification results.

7. 45 CFR Part 85 (35 Federal Register 17288).

8. Vanishing Air, John C. Esposito, July 1970, p. 54.

Obviously, not all vehicles manufactured will measure up to the standards and workmanship of the tested prototype. Once the automobile leaves the manfacturer, several hundred miles of driving may result in a malfunctioning vehicle with high emissions.

It has been suggested that emission tests should be performed by the manufacturer on every new vehicle which is produced on the assembly line. The State of California has just been granted a waiver by the Federal Government's Environmental Protection Agency to require manufacturers to perform such a short assembly-line emission test on all production vehicles by 1973.[9] This "on-line" testing would be incorporated into the other assembly-line quality control tests. If a vehicle fails to meet minimum specifications, the engine would have to be readjusted until test results were brought into conformance with specifications. Manufacturers have alleged that this approach would be too costly;[10] however, it represents a real cost which must be internalized.

To date, the Federal Government has not formally entered the field of emission control of vehicles-in-use, other than to provide money for State emission inspection program development.[11] Federal emission standards apply only to new vehicles manufactured during or after the 1968 model year.[12] Moreover, there is no Federal requirement on the owner that the emission control devices be maintained or inspected. State emission inspection programs can be designed to monitor and control the emissions of all vehicles which are in use. The obstacles to this approach are thoroughly discussed in the next section concerning the available testing procedures.

Proper motor vehicle maintenance is one important key to maintaining emissions at a minimum level. Studies have shown that periodic tune-ups and minor adjustments can eliminate a substantial amount of undesired emissions.[13] Therefore, the option of promulgating State or Federal regulations to require periodic maintenance procedures by the vehicle owner and dispense with emission inspection has been considered. This alternative should not relieve manufacturers of the responsibility to warrant a long-term properly functioning vehicle by placing the responsibility on the vehicle owner. However, the inherent problems of added maintenance cost to the owner and lack of technical manpower to properly service a vehicle apparently have been stumbling blocks to its adoption.[14] New Federal requirements have specified that manufacturers must provide instruction for proper maintenance of air pollution systems. These will take effect in the 1972-1973 model years.[15] The details of such maintenance instruction would not be included in the owner's manual because of their "highly technical nature", although they would be provided to the service industry.[16] This new requirement should encourage the use of periodic maintenance procedures.

In considering the adoption of a motor vehicle emission inspection program, the first task is to determine if the effectiveness in reducing air pollution is worth the cost. The second task is to select an adequate testing procedure in which the single most important factor will be the determination of the appropriate test cycle.

9. 36 Federal Register 17458, August 31, 1971.

10. Information was submitted by the manufacturers at hearings on proposed waiver in Los Angeles, California, on July 13, 1971. (36 FR 11824, June 19, 1971).

11. However, the 1970 Clean Air Amendments, Sec. 207 (b), provide authority for the Federal Environmental Protection Agency to establish methods and procedures by regulation for emission tests during the useful life of the vehicles.

12. Op. Cit., 35 Federal Register 17288.

13. Dickinson, G.W., Ildrad, H.H. and Bergin, R.J.: "Tune-up Inspection: A Continuing Emission Control," SAE Paper 690141, Jan. 13-17, 1969. Chew, Marian; "Auto Smog Inspection at Idle Only," SAE Paper 690505, May 19-23, 1969. Innes, W.B.; "Rapid Vehicle Exhaust Inspection by Selective Combustion Analysis," Air Pollution Control Association Meeting, New York City, June 1969.

14. "Mandatory Vehicle Emission Inspection and Maintenance," prepared by Northrup Corporation for the State of California Air Resources Board under contract No. ARB 1522, May 31, 1971.

15. 45 CFR Part 1201 (36 Federal Register 16905,) August 26, 1971.

16. In the regulations proposed on May 11, (Note 15), the manufacturers would have been required to provide detailed "written instruction for the maintenance and use of the vehicle or engine . . . as may be reasonable or necessary to assume the proper functioning of emission control devices and systems" in the owner's manual before certification of the vehicle would be approved. However, because such technical information would be useful only to the service industry and not to the owner, EPA revised the regulation so as not to require it in the owner's manual.

The factors to be considered in the selection of the test procedure include the desired impact on air quality, the setting of an acceptable failure rate, current and future emission standards, how well the measured test emissions relate to actual on-the-road emissions, the expected effectiveness of tune-ups and deterioration of emission rates following tune-up or other corrective action, inspection costs, and other logistic limitations of a total system. These factors can be reduced to a set of criteria used to evaluate the various test cycles available. General criteria, such as reliability and repeatibility for any of the tests are apparent. One study in Arizona[17] has evaluated their parameters resulting in the following set of test criteria:

1. Diagnostic capability of the proposed test. (Will it analyze the emission problem?)
2. Reasonable Cost.
   a. Operator skill, salary, training of inspectors
   b. Instrumentation available
   c. Equipment required for testing
   d. Facility required for testing
3. Reliability and repeatability
   a. Continous testing capability. (Can it be used for production testing?)
   b. Maintenance of the equipment and instrumentation. (Will the equipment and instrumentation be unduly costly to maintain?)
4. Minimum time to perform the test.
5. Within acceptable State and Federal limitations on emission tests. (Does it conform to recognized standards?)
6. Flexibility
   a. Vehicle variety (Can it be used on all types of vehicles?)
   b. Operation mode (Dynamic testing capability or only static testing?)
7. Reflects total emissions of the vehicle. (Are all pollutants included in the test and does the test reflect emissions under actual driving conditions?)
8. Predictable "pass-fail" levels. (Will the test be consistent?)
9. Simplicity
   a. Operation (Is technical training required to perform the test?)
   b. Maintenance (Is technical training required to maintain the instrumentation?)

All of these criteria define what has been referred to as a "realistic test" for automobile emissions.[18]

Various test cycles were developed in 1968 by HEW to simulate an average driving pattern of 21 minutes for vehicles in metropolitan areas--starting with a cold engine.[19] The test consisted of two parts: four warm-up cycles and five 7-mode hot cycles.[20] The emission concentrations of hydrocarbons and carbon monoxide for each mode of each cycle are calculated into a weighted average to yield a reported composite rating for each vehicle. This original Federal cycle could take up to 36 hours to perform. (This cycle is similar to the California 7-mode test.)

This lengthy and technical emission test was impractical for state emission testing programs. Thus, New Jersey and others continued to search for a shorter, more applicable test for production-inspection of vehicles. One company has developed a "Key Mode Cycle" as a quick diagnostic test cycle for vehicles.[21] The test measures hydrocarbons, carbon monoxide, and nitrogen oxides sampled by an exhaust probe which leads to a direct reading instrument package. The test is performed on a dynamometer to accommodate the normal range of vehicle weights. A Key Mode "Truth Chart" was also developed to recommend corrective measures for all possible failure patterns which may occur. The Chart and inspection report card become a diagnostic tool as a guide for proper maintenance. The Key Mode Cycle consists of three modes of operation--idle, high cruise, and low cruise--and takes about two minutes to complete once the vehicle is in place.

17. "A Proposed Emission Inspection System for the State of Arizona," Dr. Ernest Chilton and the senior Mechanical Engineering Class at Arizona State University, June, 1971.

18. "A Realistic Vehicle Emission Inspection System," E.L. Cline and Lee Tinkham, Clayton Manufacturing Co., APCA Paper No. 68-152, June, 1968.

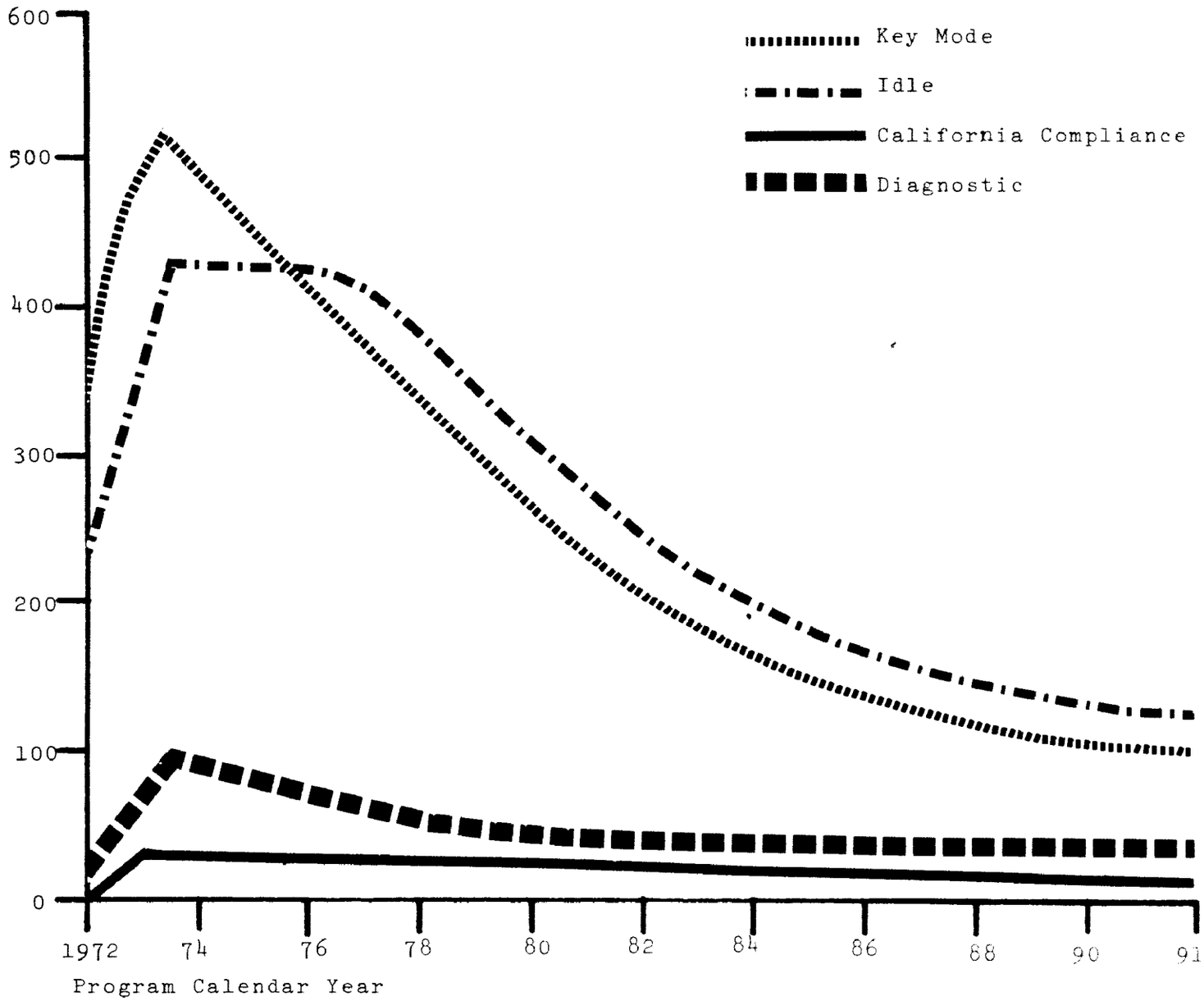
19. "The New Federal Driving Cycle for Vehicle Emission Tests," John N. Pattison, APCA Paper No. 71-12, June 27, - July 2, 1971.

20. A "Cycle" consists of numerous "modes" in the routine a vehicle is run through to simulate a driving pattern. A "mode" is a vehicle operation which is either an acceleration, a cruise, a deceleration, or idle.

21. The Clayton Manufacturing Co., El Monte, Calif.

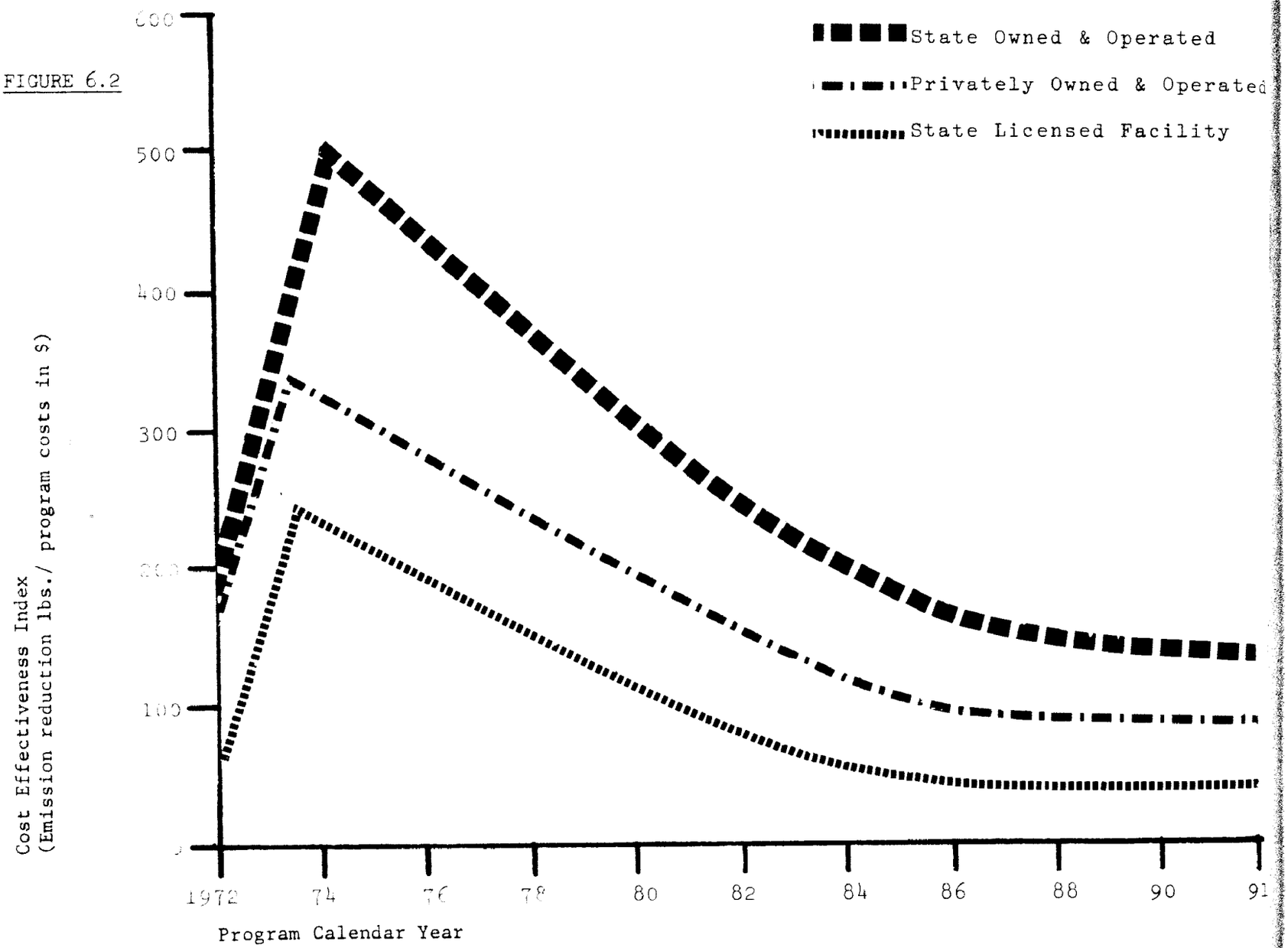
TEST REGIME COMPARISON - STATE OWNED & OPERATED FACILITIES

FIGURE 6.1



OWNERSHIP & OPERATION COMPARISON

FIGURE 6.2



New Jersey experimented with selected testing procedures which resulted in their "ACID CYCLE" derived from the 7-mode driving schedule. This short test cycle performed with the vehicle on a chassis dynamometer consists of four modes--a constant acceleration, cruise, constant deceleration, and idle--taking only one minute to complete. Because of its dynamic modes of operation, this cycle has been difficult to perform with any degree of repeatability. (Repeatability refers to the consistency of results obtained from repeated tests on the same vehicle). New Jersey also has a 7-mode "hot cycle"[22] which takes two and one-half minutes to run using the same loading conditions as the Federal cycle. However, this cycle also has the same disadvantage of poor repeatability as the ACID cycle.

Several states, including New Jersey and California, have been evaluating a test performed with the engine operating at idle. The idle test can be performed in less than one minute and does not need the usual dynamic equipment, i.e. dynamometer, that the other quick cycle tests require. Its effectiveness in detecting high polluters has been reported in a study performed by the New Jersey Department of Environmental Protection in 1970.[23] They found that overall corrective maintenance, as measured by their idle test before and after maintenance, achieved emission reductions approaching 60% for those cars which failed both carbon monoxide and hydrocarbons in the idle mode.[24] The advantage of the idle test is that at the present time, reliable, low-cost exhaust emission testers are available to support the service industry of the idle inspection program, while the dynamic quick cycle (Key Mode, ACID, and Federal cycles) all require more sophisticated equipment.[25] The disadvantage of all short cycle testing is that the relationship between emissions observed during the short cycle test to emissions during real on-the-road driving is unknown.

It is necessary to add a warning about the variables encountered in any emission inspection program. Consideration must be given to the specific instrumentation suited for continuous inspection. This report does not discuss in detail the various models of testing equipment available.[26] Whatever selection of equipment is made, one model should be used uniformly for all tests since test results may vary substantially with different equipment. Vehicle pre-conditioning, i.e. temperature of the engine, greatly affects the emission results, as does the use of different fuels. Some vehicles may have leaky exhaust systems which will influence the results. Moreover, the differences in make and model of engines and whether the emission measurement is taken while the vehicles are in neutral or drive gear will determine the degree of accurate reading. All of these variables must be considered in any comparisons to emission standards which are adopted.[27]

Finally, the impediment of lack of service expertise must be resolved. There is a general deficiency of properly trained mechanics who possess the knowledge to tune-up high emitting vehicles.[28] One study done in New Jersey,[29] found that "garage" tune-ups did not vary significantly from tune-ups done "in-house" by trained mechanics once the garage mechanics had been given some orientation to high emission causes. The study concluded that a mechanic could do an acceptable job if accurate information concerning the cause was available. However, no estimate was made as to whether the general population of mechanics could be suitably trained and motivated.

STATE EMISSION PROGRAMS

New Jersey Experience

In 1966, legislation enacted by the State of New Jersey provided for a program to control motor vehicle emissions

22. A "Hot" cycle refers to a test which can be performed on a car that has been operating prior to the test; the original Federal 7-mode "cold" cycle required the vehicle to stand for at least twelve hours without operating before the test was performed.

23. "The New Jersey Repair Project Tune-up at Idle," A.J. Andreatch, J.C. Elston, and R. Lahey, APCA Paper No. 71-108, June 27-July 2, 1971.

24. Ibid., P. 22.

25. Ibid., p. 28.

26. The following studies have evaluated numerous emission test instruments: Northrup Study; Arizona Study; N.J. Repair Project Report; and "Performance Evaluation of Hydrocarbon/Carbon Monoxide Instrumentation Suitable for Passenger Vehicle Inspection Station Operation," California Air Resources Board, July 1971.

27. Op. Cit., New Jersey Repair Project, p. 5-8.

28. Op. Cit., New Jersey Repair Project, p. 1-1.

29. Op. Cit., Clayton Key Mode.

including the establishment of standards for, and regulation of, carbon monoxide, hydrocarbons, and smoke emissions consistent with the "National Emissions Standards Act." The research effort was separated into two programs--one dealing with diesel fuel and the other with gasoline. Late in 1966, Scott Research Laboratories, Inc., under contract to New Jersey, initiated research and development work on simplified vehicle emissions inspection equipment, techniques, and procedures for gasoline fuels.[30] By October of 1967, two prototype vehicle emissions inspection systems were completed. The systems consisted of simplified and rapid exhaust and crankcase emission testing procedures, sample collection equipment, emission measuring instruments, a vehicle loading device and a means of data display. The four-mode ACID cycle was developed which allowed for reasonable correlation with the Federal seven-mode cycle. Design criteria imposed upon the system required a complete vehicle test within one and one-half minutes as the vehicle was driven through a New Jersey State operated safety inspection station.

In the second phase of their program, the emission inspection system was further tested, developed, and refined into a third prototype system. To aid the state in ultimately setting emission standards for use in statewide motor vehicle inspection, emission data was obtained on 200 pre-1968 privately owned New Jersey vehicles equipped with exhaust control devices in order to obtain a fleet which would be representative of post-1968 New Jersey vehicles equipped with emission control devices.

Further emission data was gathered from the first prototype New Jersey vehicle inspection system and from the Federal procedures used in testing and certification of new vehicles with exhaust control systems. All vehicles were tested in the condition in which they were received. Portions of both the New Jersey and California fleets were tested before and after tune-up to put them in a properly functioning condition relative to exhaust and crankcase emissions. Cost data was then derived from the tune-ups that were performed.

Early in 1969, a parallel program was also initiated by the State of New Jersey to sample motor vehicle exhaust emissions at a state owned safety inspection station. The purpose of this sampling program was to obtain baseline emission data and refine testing technique in order to determine motor vehicle inspection emission standards for New Jersey.[31]

In addition, the New Jersey Department of Environmental Protection instituted a study designed to determine other causative factors in emission level variations between representative groups of motor vehicles. Their program objectives were as follows:

1. To determine emission level variations in mass units for these various inherent groupings of motor vehicles.
2. To determine those parameters which should be differentiated as to the establishment of state standards.
3. To lay the groundwork for the study of engine diagnostic techniques according to emission levels.

The expected results will guide New Jersey in dealing with some of the following practical realities which will ultimately determine the motor vehicle inspection standards:

1. A reasonable rejection rate designed not to overtax the inspection system and the automotive service industry.
2. Optimum selection of the highest emitters.
3. The probability of engine emission response to proper maintenance.

On August 10, 1971, New Jersey considered a proposed regulation for testing of vehicles at idle.[32] This test would not require sophisticated instrumentation or dynamic testing equipment. The proposed test would be integrated with the state inspection system. This program envisions the addition of equipment at its 70 state-operated safety inspection lanes to test exhaust emissions for carbon monoxide and hydrocarbons. Investment cost for emission inspection at idle

30. The results of the Phase I program were detailed in "Final Report for Phase I of the New Jersey Motor Vehicles Emissions Program" presented to the New Jersey State Department of Health.

31. Preliminary results of this program are outlined in "Reduction of Exhaust Pollutants through Automotive Inspection Requirements - - The New Jersey Repair Project."

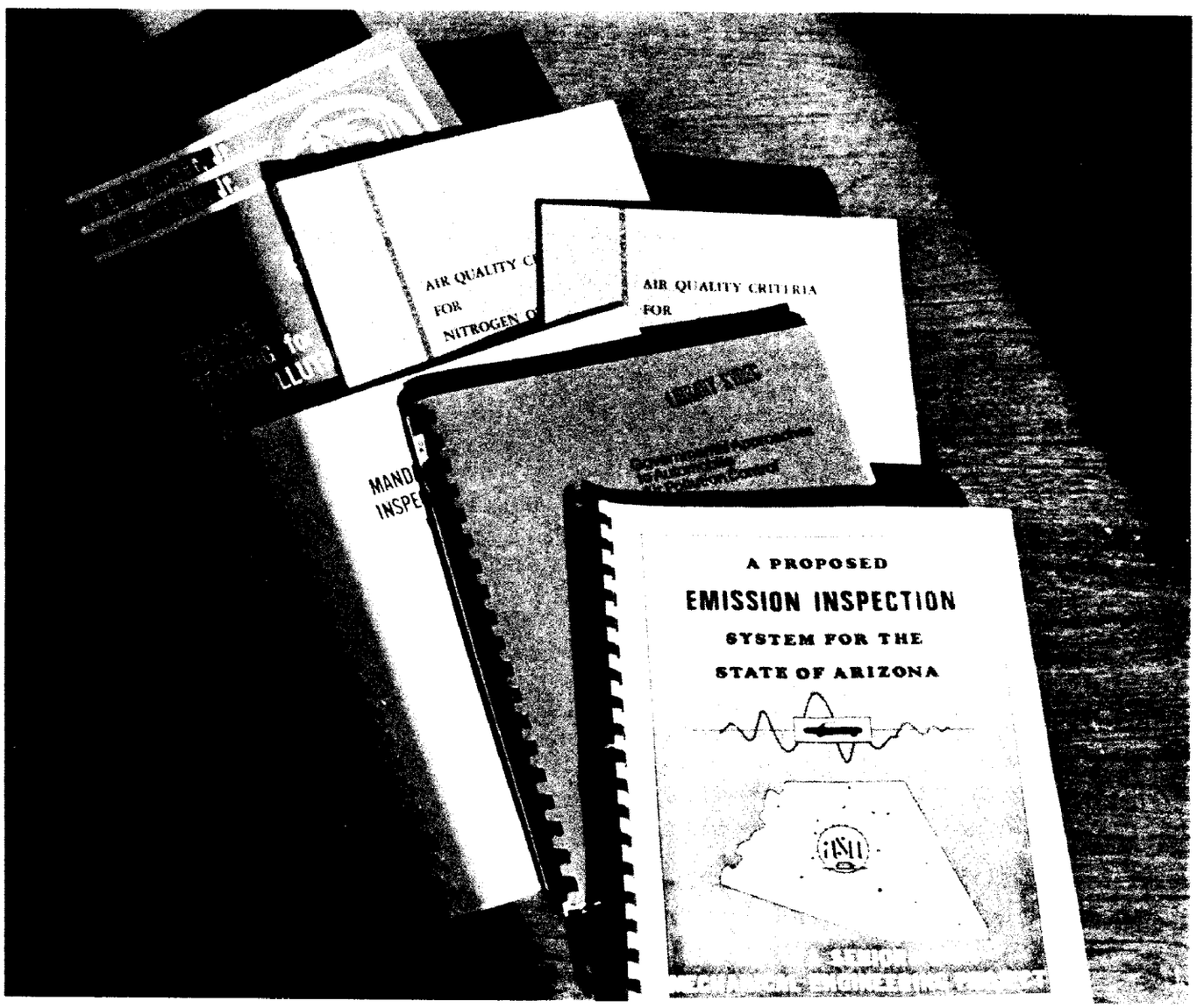
32. See New Jersey Air Pollution Control Code, Chapter 15, Ref. P.L. 39:8-10.

is $2,000 per lane with no increase in manpower required. Looking to the future, New Jersey hopes to include a dynamic test which will require an investment of $50,000 and estimated operating costs of $15,000 per lane per year. East test will take less than one and one-half minutes and will not slow present inspection rates. With this program, a large proportion of substandard vehicles can be detected.

New Jersey considered the ability of service stations and garages to perform corrective maintenance for carbon monoxide and hydrocarbon emissions, and concluded that instrument costs and technical capability would not be a limitation, provided maintenance information and training were available.

District of Columbia Project

In June, 1970, the District of Columbia and the U. S. Department of Health, Education and Welfare--National Air Pollution Control Administration (NAPCA), now part of the



Environmental Protection Agency, negotiated a contract for a research and development project relating to the control of vehicle exhaust emissions. The objectives of the project included the collection of data on emission levels of vehicles presented for inspection; field tests of available instrumentation that could be reasonably used in an inspection station; determination of causes of "high" readings through diagnostic techniques and motor adjustments of the vehicles; and the determination of costs to the motoring public to maintain a vehicle at a minimum emission level.

Two research lanes were established--one at each of the two inspection stations in the District. Presently, test cars are selected from the inspection waiting lines and asked to run through the research lane. The current inspection standards are applied even though the vehicle undergoes an emission test, a dynamic brake test, and more rigorous visual inspection. If the vehicle displays a high emission count, minor adjustments are made with the vehicle owner's permission and the vehicles are retested to determine the results. Special forms are used in the research lanes in addition to the regular inspection record cards. These forms are used to supply source data to an Information Retrieval System.

The collection of data on emission levels has been limited to selected car manufacturer and model years. The project has utilized three separate gas analyzers for emission testing of hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides. Normally, only the data on tests for HC and CO are recorded. A comparison for evaluation of emission testing equipment is being made; however, the project has not yet made public any of its conclusions.

Wisconsin Project

In December, 1969, the Motor Vehicle Inspection Department in the State of Wisconsin initiated a program to test motor vehicle emissions. The program's objective was to lower the operating costs of State vehicles and reduce pollution by experimenting with diagnostic testing procedures. The MVI Department further hoped to gain some firsthand operating experience while examining the potential for implementation of a full emission testing program in all the MVI inspection lanes.

The emission testing program has been fully financed with $50,000 of State funds from their Department of Transportation. The funds furnished were sufficient to purchase used emission testing equipment from the Clayton Company and to lease a bulding which was built to their specifications.

The initial tests were performed at this station on 241 new motor vehicles belonging to the Department of Transportation. The bulk of the vehicles had 50 to 100 miles registered; however, the average mileage was approximately 12,000 miles. Of the 241 vehicles inspected, 83% needed carburetor adjustments of some kind and 40% needed timing adjustments. Carburetor adjustment at idle was the only adjustment made before retesting. The quantitative results are shown in the table below:

RESULTS OF WISCONSIN'S EXPERIMENTAL EMISSION PROGRAM

	BEFORE	AFTER	IMPROVEMENT
Idle	4.00	1.29	2.71
Low Cruise	.88	.55	.33
High Cruise	2.04	1.91	.23

HYDROCARBONS in parts per million (ppm)

Idle	203	135	68ppm
Low Cruise	138	122	16ppm
High Cruise	160	144	16ppm

The MVI Department is now preparing to undertake a program of checking vehicles in use. They expect that the results will be even more dramatic.

California Experience

The first recognition of severe air pollution problems from automobiles, and the first regulation dealing with these problems originated in California. In 1959, the California Department of Public Health adopted the first statewide motor vehicle emission standards. Within two years, the California Legislature had established the State Motor Vehicle Pollution Control Board and issued test procedures with criteria for crankcase devices and exhaust controls. By 1966, the California Highway Patrol began random roadside checks of mechanical conditions of vehicles, including smog

device installation. One year later, the California Air Resources Board was established to coordinate state, regional, and local efforts to combat air pollution problems within the various air basins in the State. Finally, in 1969, the Federal government granted California a waiver to allow the State to enforce stricter motor vehicle emission standards than those in the other 49 states.

During 1970, the California Air Resources Board's program for motor vehicle emissions control was strengthened in a number of ways as control of emissions from motor vehicles in California became progressively more stringent. The program included several firsts in the field. Systems for reducing oxides of nitrogen were required on new model passenger vehicles. Standards and test procedures for heavy-duty vehicles, including diesels, were adopted. Procedures for testing light-duty vehicles at the assembly line were developed. The Board and its Technical Advisory Committee investigated such measures as eliminating lead additives in motor fuel and limiting the volatility and olefin content of gasoline as a means of reducing vehicular pollution. Legislative proposals were developed for removing lead from gasoline, and regulations on volatility and olefin content of gasoline were proposed and will be considered for adoption by the Board in 1971.

The Board looked into alternatives to the present approach of relying on control systems to control vehicle emission. Engines converted to use liquified petroleum gas or natural gas were tested. Several such systems were approved as meeting the Board's emission requirements, and as being eligible for tax exemption provided by the Legislature in 1970.

The Board continued to seek control and evaluated several control systems for the pre-1966 vehicles. These account for about 50 percent of the vehicle population. Effective control of these vehicles would achieve cleaner air at a faster pace.

In looking ahead for motor vehicle emission control in the coming years, the Board promulgated standards for the 1975 model vehicles, both light and heavy-duty, and requested a waiver of Federal preemption of these standards. The U. S. Environmental Protection Agency will hold a waiver hearing on standards for heavy-duty vehicles, but it declined to hold a hearing on standards for light-duty vehicles for 1975 models on the basis that more stringent standards have been developed by the Federal government.

Selection of a Testing Program

The selection of a motor vehicle emission inspection program should be determined after specific criteria have been established. Sample criteria for testing procedures were suggested in the previous section. A cost effectiveness analysis was used in a recent report evaluating test regimes for the State of California.[33] This report, prepared by the Northrup Corporation for the California Air Resources Board, analyzed four testing cycles--the Key Mode, the idle test, full diagnostic test, and the California Certificate of Compliance Test. The Key Mode test and the idle test with corrective maintenance produced the maximum emission reductions and were clearly the most cost-effective approaches.[34] (See Figure 6.1)

The inspection cost per vehicle in a State owned inspection center using the Key Mode test was estimated to be $1.05. The average repair cost for vehicles that failed the inspection was $24.85. The study showed that those repaired vehicles could then expect an $8.70 annual savings in fuel cost so that the average net expense to the owner was $16.16 plus the inspection fee. This result would conservatively eliminate 10% of the automotive emissions in California's atmosphere even if the implementation of a program was delayed. To eliminate the same amount of pollutants with any other known method was estimated to have cost three to five times more per vehicle.

The Northrup study further evaluated State versus privately owned and operated inspection stations and concluded that State ownership and operation was the most cost-effective in terms of pounds of pollutant reduced per dollar per year. Their cost-effective ranking of alternatives is shown in Figure 6.2.

The cost advantage of State ownership was derived from the absence of private industry taxes and profits. In either of the private ownership options, there would be a requirement for

33. Op. Cit., Northrup Study, p. 2-1 and 2-2.

34. Op. Cit., Northrup Study, p. 8-2.

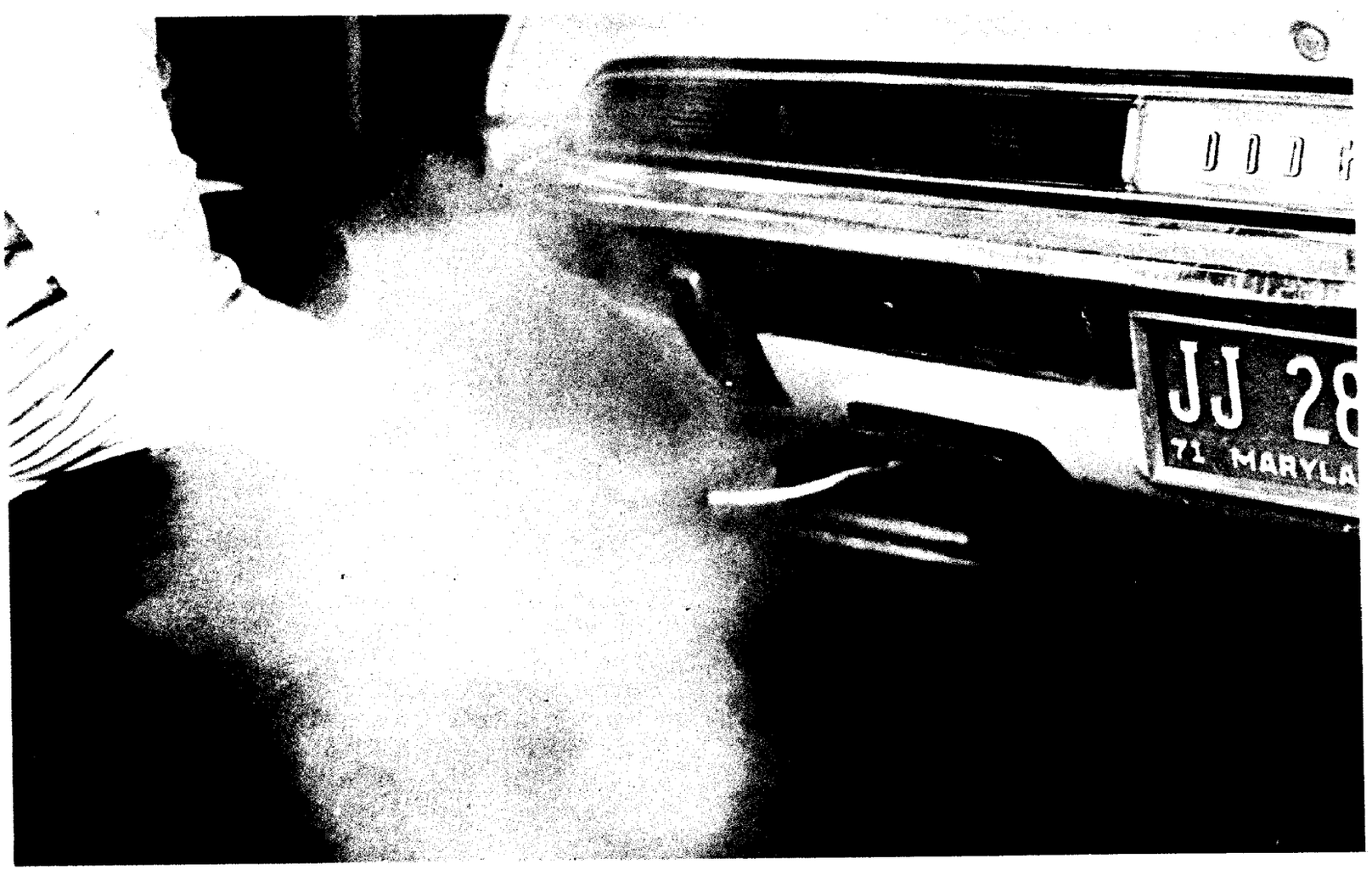
a State regulatory function, which further adds to their cost.

These reported results indicate that the inclusion of an emission testing program with regular periodic motor vehicle inspection should yield an even more cost-effective outcome.

Other State Options

A state has several other alternatives for control of automotive air pollution, besides instituting an emission testing program. The option of requiring maintenance procedures without inspection was already briefly mentioned. Since it has been demonstrated that periodic maintenance will reduce emission levels, a state might prescribe annual or semi-annual tune-ups and visual inspections, as well as recurrent certification of all pollution control devices presently installed. In fact, the states not only have the power to require maintenance and inspection of Federally required pollution devices, but they are encouraged and expected to do so when it is found necessary to achieve established air quality goals.[35] Unless the state itself undertakes the inspections, close supervision of a program would be advisable to protect the vehicle owner from potential abuses. Supervision would be similar to that presently required for the state-licensed system of periodic safety inspections.

35. See Hearings on Automotive Air Pollution Before the Sub-Committee on Air and Water Pollution of the Senate Committee on Public Works, 90th Congress., 1st Session 109 (167).



Another proposal for the state to consider is the regulation of pre-1968 vehicles which do not have pollution control devices installed.

State requirements could specify that all vehicles which are sold or transferred in the state must be inspected for pollution control equipment that is in working order. Further, the state could limit the sale of certain sizes and types of engines, if they are found to lend disproportionate amounts of pollution to the air. Imposing strict emission limits on state-purchased vehicles is another step which should be considered. The state, like any other customer, presumably is free to buy what it chooses. This was one of the first steps the Federal Government took in 1964 to regulate the purchase of vehicles for Federal use.

When an automobile is equipped with a pollution control device, its emissions depend not only on the design and mode of operation of the device, but also on the fuel to operate the vehicle.[36] The influence of fuel composition, especially fuel additives, will become increasingly important as more stringent standards are applied to emissions. Thus a state might tax or prohibit the sales of leaded fuels or other harmful fuel additives. Although the Federal Government was given authority to require registration and regulation of fuel additives,[37] the Administrator of EPA has only exercised his authority in registration and not in their regulation. The Department of Commerce's Technical Advisory Board Panel on Automotive Fuels and Air Pollution has recommended that the Federal Government play a stronger role in regulating this area; however, it is still open for state initiative.

Finally, one strategy which has not gained general acceptance in controlling the increase in concentrations of automobile air pollution is the restriction of the use of automobiles in specific areas at specific times. Pollution becomes a serious problem in direct relation to the capacity of the air to disperse pollutants. In the urban areas, where congestion and frequent stop-and-go operations are the greatest, the largest amount of pollutants are present.[38] The Senate Public Works Committee Report on the 1970 Clean Air Act Amendments estimates that as much as 75% of the traffic may have to be restricted in the next ten years in certain large metropolitan areas if health standards are to be achieved.[39] The California legislature discussed and rejected one bill during the past session that would have banned cars from the core areas of 19 major California cities. The feasibility of a complete ban of automobiles would be effective and practical only where support public transportation would be capable of handling the commuter population.

A less strigent measure than the total ban on automobiles in a designated area is the selective ban-- the diversion of traffic flow away from major business and shopping areas. The New York Department of Air Resources took air pollution readings during the traffic ban on automobiles on Fifth Avenue and Madison Avenue in New York City last April. The measurements were taken several days before and after the traffic ban to be compared with hourly measurements which were taken every day during the two-week period in which the traffic was restricted from 10:00 a.m. to 2:00 p.m. The air pollution readings indicated that the normal carbon monoxide level was reduced by as much as 90% when the vehicle traffic was eliminated.[40] (Crosstown traffic was not restricted.) Two further results were observed: contrary to expectations, sales in the commercial area did not suffer and it was proven that through careful planning, traffic could be successfully re-routed.[41]

Therefore, a state might consider the exclusion of vehicle traffic from designated areas during peak hours in order to lower the level of air pollution to protect the public health.

Federal Response

The Environmental Protection Agency's Mobile Source Control Program has the major responsibility for evaluating

36. "Automotive Fuels and Air Pollution," U.S. Dept. of Commerce Publication, March, 1971.

37. Clean Air Amendments of 1970 (P.L. 91-604) Section 211, 42 U.S.C. 1857f-6c.

38. "Variables Affecting Traffic and Vehicular Operating Conditions in Urban Areas," in Air Quality Standards, A.M. Voorhees, (Columbus, Ohio; Charles I. Merril, 1970.

39. National Air Quality Standards of 1970, Report of the Commission on Public Works, U.S. Senate, Report No. 91-1196 (Sept. 17, 1970) p. 2.

40. Report to the Mayor's Office entitled "Impact of Madison Avenue Traffic Ban on Air Quality and Noise Levels," New York Department of Air Resources, April, 1971. (Air pollution levels were reduced from 22ppm to 7-8 ppm in most cases.)

41. A continuing survey of merchants and businesses was taken during the traffic ban to ascertain the sales effect. Overall 63% of those surveyed were in favor of the ban.

testing procedures and developing potential motor vehicle emission testing guidelines for the states. Presently, they have contracted to perform two large studies to determine both cost and effectiveness of various inspection-maintenance procedures. The information needed is in the area of effectiveness of these tests since most past studies have based their effectiveness determination on a comparison with the old Federal 7-mode test procedure. The Bureau has questioned the validity of correlating the test results from experimental short cycles with this 7-mode test. To verify their doubts, the Bureau is investigating the effectiveness of test procedures based on a total mass emissions test which is different than the old 7-mode test. The 7-mode test was based on a concentration measurement which can be misleading depending on the testing conditions and procedures utilized while the mass emission test actually measures the mass emissions coming from the tailpipe for an entire cycle. The concentration measurements of emissions for example, have made the idle test appear more successful than perhaps it actually is since only one mode of the driving cycle is tested. This latest work has been concerned with the new 1972 test procedure, commonly referred to as the "L.A.-4" test, which more accurately represents actual on-the-road emissions.[42] (The L.A.-4 test refers to the nonrepetitive, 23-minute driving route that was derived from a street route worked out in central Los Angeles; the route contained various street types and driving mode distributions.)

At the Environmental Protection Agency's technical laboratory in Ypsilanti, Michigan, the evaluation of several short cycle tests, namely the idle, Key mode, and other state tests which have been developed, has resulted in the development of a transient short cycle test similar to the ACID cycle test used in New Jersey. This two-minute test is undergoing close analysis and comparison with other test results. EPA expects to have results of these tests by December and to present potential test procedure guidelines to the State by January 1972.

Conclusion

The Federal Government should soon be announcing their research conclusions as to the effectiveness of an emission testing program that utilizes a short cycle test. Therefore, it would be premature for a state to undertake an expensive emission testing program for the purposes of evaluating some short cycle test until the Federal test results are made public. Some states have instituted testing programs in the interim to begin a training program for mechanics and to introduce the emission inspection idea to the public. Both New Jersey and California have adopted a test at idle for these reasons. Maryland might consider the same proposal until a reliable short-cycle test is made available.

The motor vehicle inspection facilities should be designed to allow for the addition of motor vehicle emission inspection. The presentation of model alternatives in this report has considered the time and space allocations needed. If the Federal Environmental Protection Agency should find favorable results from one of the short cycles and recommend that the states adopt such a test, Maryland will be prepared to easily implement an emission inspection program in conjunction with their other inspection procedures.

42. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines," Federal Register, Vol. 35, No. 219, Part II, November 10, 1970.

7
STATE CENTER CONCEPT

COORDINATED APPROACH

> "If states are going to move into land acquisition programs for periodic motor vehicle inspection, it is not unreasonable to consider broadening the scope of inspection stations so that they are, in fact, regional highway safety centers that provide a full range of services, thus spreading the costs over many programs. . ."[1]

If Maryland should embark upon a comprehensive periodic motor vehicle inspection program, the consideration of consolidating several state motor vehicle services into one physical location is vital. The concept of a State Regional "Multi-use" Center would provide the benefits of coordinated motor vehicle services in decentralized locations throughout the State. This means convenience to the public in transacting their motor vehicle business of registration, motor vehicle inspection, and driver license testing or renewal in one trip. The State benefits by savings in cost of building maintenance, administration, and overhead as well as encouraging more coordinated work efforts and better communications.

Several State operations should be considered for incorporation into one State Regional Center. The selection of which operations should be consolidated is primarily dependent upon the functional relationship of one service to another. The final judgment should be made on the basis of need, practicality, and efficiency. The operations to be considered are the following:

(1) Motor vehicle inspection
(2) Motor vehicle registration and titling
(3) Driver license testing
(4) District court operations
(5) State Police

The accommodations of Motor Vehicle inspection, registration, and driver license testing in one State Regional center is the most compatible from the standpoint of need for expanded facilities and coordinated activities. For example, if Maryland is to comply with Federal requirements[2] for re-examination of drivers every four years, an increase from roughly 225,000 license applicants a year to 650,000 applicants, branch office facilities will have to be expanded. Expansion will mean either more negotiated three year leases, use of mobile units, or the initiation of a land acquisition program. Therefore, the inclusion of branch office operations with motor vehicle inspection improves the prospect of undertaking a land acquisition program.

In support of this position, a recent study of the New Jersey periodic motor vehicle inspection program was critical of the lack of coordination between separate registration and inspection operations. The study recommended that registration and inspection operations be more closely aligned to prevent "the dumping of unsafe and uneconomically repairable vehicles on unwary or technically ignorant buyers" where registration preceded inspection. The consolidation of these operations would improve the feasibility of coordination.

Delaware has coordinated registration, titling, driver testing, and inspection for more than thirty years. Their successful experience confirms the advantages of such a proposal. Their system is being carefully refined to eventually produce an integrated computer information retrieval and updating data bank system. This system would utilize satellite console units to retrieve motor vehicle information when a vehicle is presented for inspection or registration, and thereafter simultaneously update the bank at the close of the transaction.

Secondly, the consideration of establishing district courts in the State Regional Center would further increase the opportunities for coordinated operations and an expanded revenue base for acquiring land. In the development of the district court system, the majority of court facilities were found to be inadequate and in dire need of expansion. Court room space has been leased in something less than adequate conditions to meet present work loads. If the courts are included in the State Regional Center, their capital and operating costs attributable to the center could be covered by an annual leasing arrangement.

In several areas, the district court operation could be closely coordinated with those of the Motor Vehicle Department.

1. Remarks by Ejner J. Johnson, Maryland's Commissioner of Motor Vehicles; testifying on Senate Bill 976 before the Senate Commerce Committee on May 18, 1971.
2. Highway Safety Program Standard Number 5, Driver Licensing.

The reporting of convictions, the auditing of books, the reporting and updating of records and perhaps in the future, the accounting of revenue from traffic fines and costs could all be accomplished through integrated operations. The information collected can be instantaneously fed into the same computer outlet used for motor vehicle inspection and other motor vehicle operations.

A fourth party to the State Regional Center might be represented by a detachment of the Maryland State Police. This possibility would seem particularly important if they were to assume some major responsibility for administering the Motor Vehicle inspection program. In addition, the presence of officers could indirectly benefit both the motor vehicle inspection program and the district court operation.

The State Police have indicated an interest in investigating this arrangement since there are counties such as Garrett County where a needed detachment could be located in the State Regional Center.

However, there is a need for further investigation into more specific requirements of the district courts and of the State Police. The policy decisions regarding work feasibility and desirability of combining various State operations must first be made since they may considerably affect the final decision on station location.

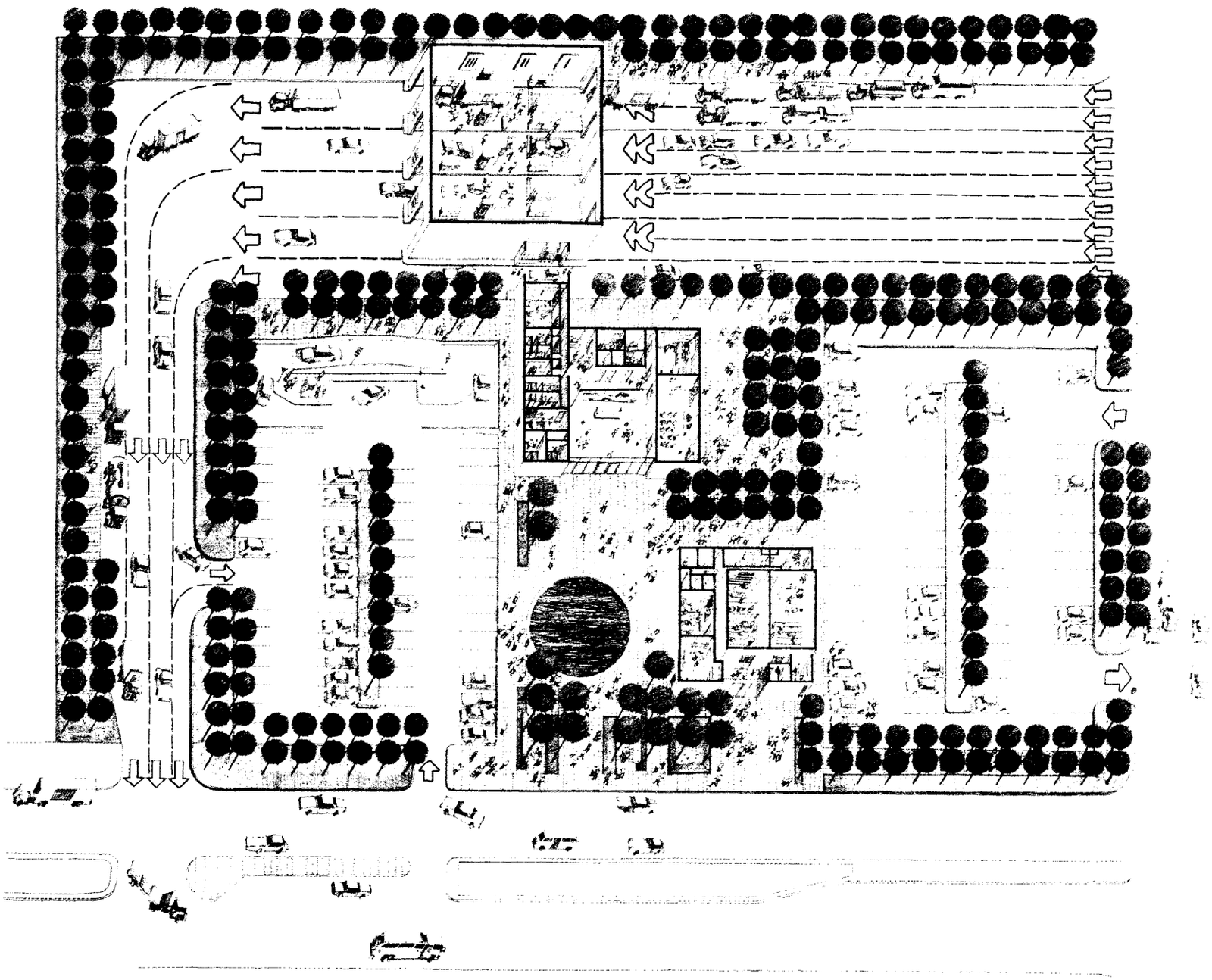
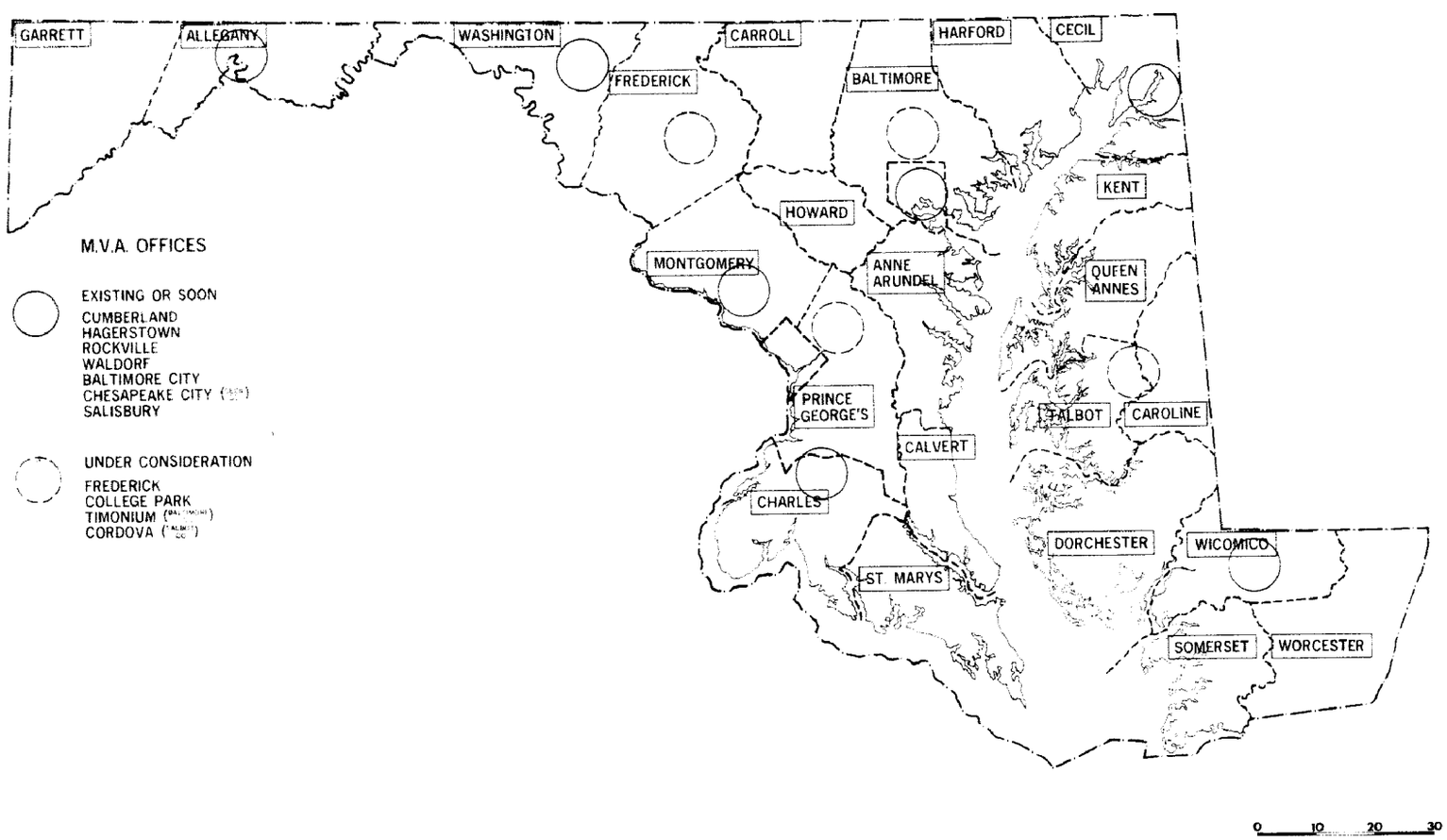


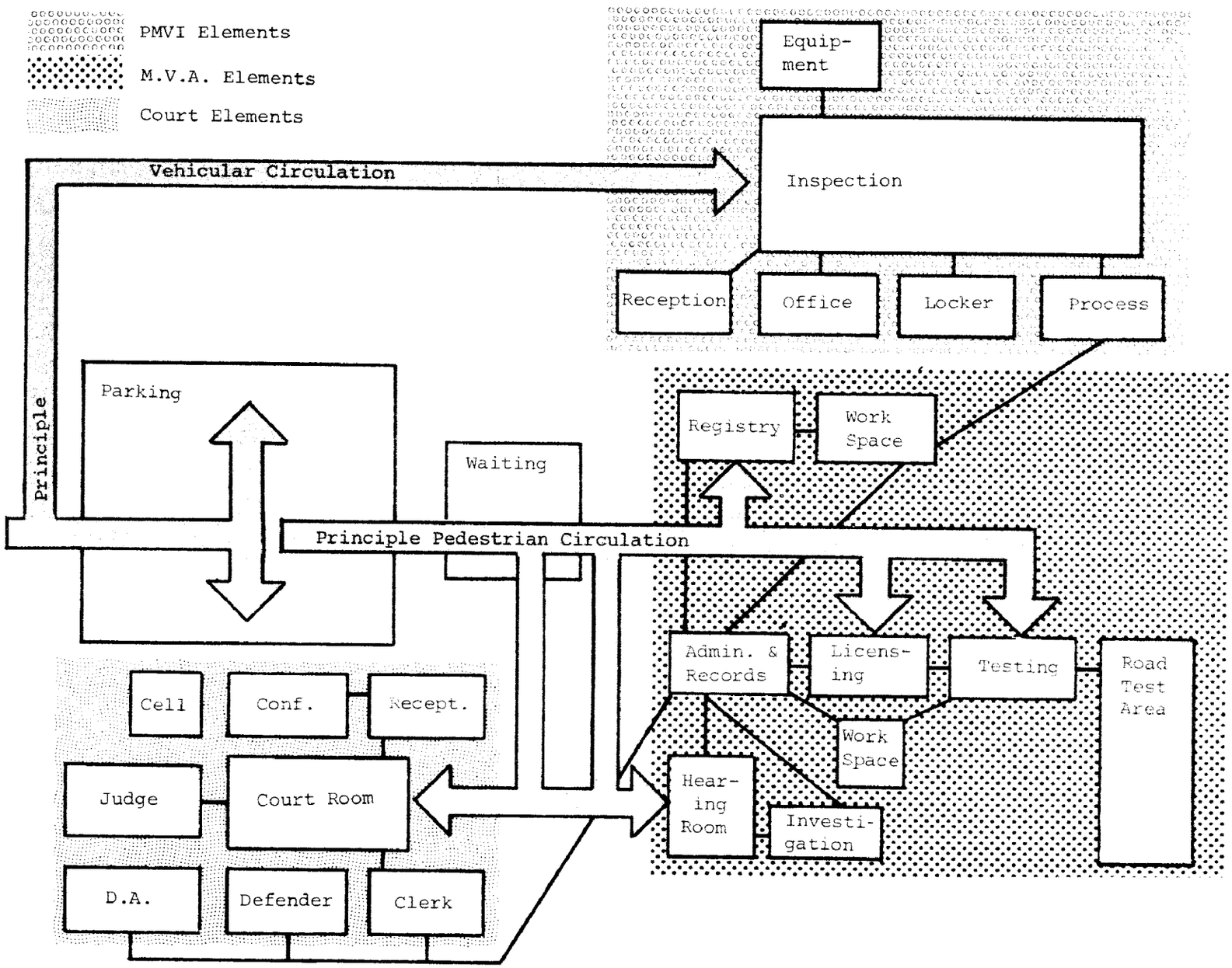
FIGURE 7.1 PROTOTYPE SITE LAYOUT



REGIONAL MOTOR VEHICLE ADMINISTRATION OFFICES—1972

FIGURE 7.2

FIGURE 7.3 ORGANIZATIONAL ANALYSIS FOR STATE CENTER CONCEPT



8

MODEL DEVELOPMENT

DEVELOPMENT OF MODEL SYSTEMS

This phase of the report explains the development of several models for a periodic motor vehicle inspection system. Before each model was designed, specific criteria and assumptions were agreed upon. The Task Force reviewed these criteria and assumptions before the development phase of this study progressed.

Assumptions

(1) The State owned and operated motor vehicle inspection system was selected as the primary route for analysis.

(2) The development of alternative models assumes the desirability of performing similar State functions in the same complex for the convenience of the public and the efficiency of motor vehicle operations. However, the presentation of plans, costs, and recommendations have been segregated so as to compare the relative costs and plans of each individual operation.

(3) In the planning and estimation of costs for the various models, it has been assumed that land is available in the general locations in which we have suggested that permanent stations be established. Representative land prices were gathered in several of the major counties to indicate their range.

(4) In order to assure the best safety inspection, the most up-to-date equipment was selected, i.e. the dynamic brake test in lieu of the more traditional static brake platform tester. The dynamic-brake-test equipment is comparable in cost to the static brake tester, yet performs a superior analysis of brake condition.

(5) The continued use of on-the-road warnings and fleet inspections is an important supplement to any proposed system. The on-the-road warnings serve as an important check on the effectiveness of the inspection system while fleet inspection licenses permit fleet owners to qualify for self-inspection, thus, relieving the burden on the State inspection facilities.

(6) This report contains an outline of State emission testing programs which are being developed. The models were designed to include an emission testing program in the PMVI system at some future date.

Study Criteria

In attempting to locate the periodic motor vehicle inspection system stations (PMVISS) in an equitable manner throughout the State of Maryland, the following criteria were developed and adhered to:

(1) Full Safety Inspection Coverage--in order to comply with National Highway Safety Program Standards, a full periodic motor vehicle inspection system including truck inspections is required.

(2) Coordinated Public Facilities--in order to minimize travel costs and the public's time, while providing efficient services, the PMVIS stations will combine motor vehicle inspection, licensing, registration and court facilities within the same physical plant.

(3) Flexibility of Facilities--to allow for implementation of new safety inspection procedures and potential emission control tests, the centers have reserved time and space for additional inspection operations.

(4) Convenience of Location--so as to locate inspection stations within a reasonable distance of where the greatest number of motorists reside, it is recommended that inspection stations be within twenty minutes travel time for residents of population centers and a maximum of forty-five minutes for outlying residents, and within a maximum driving distance of 30 miles.

(5) PMVI Stations--in meeting the location criteria the stations will respect local zoning laws to every extent possible and locate the station where the facility and all its services will be compatible with surrounding property developments.

(6) Main Traffic Arteries--consistent with other location criteria PMVI stations, whenever possible, will be located on major traffic routes for added convenience to the public.

(7) Lane Use--in an effort to properly coordinate public services, minimize development costs and therefore public expeditures, the PMVI stations will be located (a) on existing publicly held lands if the location meets

other criteria and (b) on private property if public property is not available (conditional upon reasonable cost and appropriate location).

(8) State-of-the-Art Equipment--the selection of equipment has been made to offer the most current and comprehensive readings of the safety condition of the motor vehicle.

(9) Maximum usage of Equipment--due to the high cost of land, buildings, and equipment, the inspection stations will be located close to population centers so as to use the facility to its maximum and most efficient extent.

(10) Uniformity of Tests--all equipment should be the same and tests performed in the same manner to ensure that all vehicles undergo the same degree of testing.

(11) Consumer Protection--in order to provide in the large centers a full diagnostic service for the public to test the condition of vehicles for proper performance and safety.

(12) Implementation of PMVI--in order to accommodate government requirements the system should be implemented as soon as practical.

(13) Inspection Time--that inspection time for vehicles should be kept to a minimum for the convenience of the public.

(14) Inspection Cost--the costs of inspection to the State and to the vehicle owner should be kept to a minimum without sacrificing efficiency and effectiveness.

MODEL NO. 1

Description:

Model No. 1 was developed to investigate the feasibility of proposing a Periodic Motor Vehicle Inspection (PMVI) System that utilized permanent State owned and operated inspection centers. As noted in the reported assumptions, the PMVI centers will be coordinated with the other State functions of motor vehicle registration, driver testing, and district courts whenever feasible.

The PMVI lane will contain equipment which consists of a dynamic brake tester, front end lift, scuff detector plates, and headlight tester. The inspection lane layout has four intermediate stops (stations). The total time for a motor vehicle inspection in the automobile lane would be twelve minutes. This time is apportioned between the four stations to yield a production time of one car every three minutes. Supplemental time and space allowances have been provided for future automobile emission testing and for further safety inspection procedures.

Additions to Model No. 1 Development

The first addition to the permanent station is a "diagnostic lane or stall." Presently, Maryland has only a few privately owned diagnostic centers which charge an average of five to ten dollars for an automobile inspection. These diagnostic centers inspect annually less than 1% of the motor vehicle population in the State of Maryland.

However, because of the increasing emphasis on diagnostic services and the need for consumer information, the models developed in this report have included in the large centers a diagnostic lane or stall. Its purpose is to offer a reliable objective evaluation of the vehicle's condition which is supplementary to the required minimum safety inspection. The diagnostic test would be provided as a service to the Maryland motorist and should be financed completely by a special diagnostic test fee.

The second addition to the normal motor vehicle inspection center is an exclusive truck inspection lane. In order to present the most effective inspection program for the State of Maryland, the inspection of trucks is essential. Therefore, the permanent station models have included an inspection lane for trucks. There are almost 180,000 trucks in Maryland which could utilize this lane, and by 1980 this figure will have increased to almost 285,000. (These figures have been adjusted to reflect a conservative estimate that 20% of the trucks will be inspected under a fleet inspection program which was discussed earlier.) Federal Motor Carrier Safety Regulations apply to 30% of the trucks in Maryland which are common carriers, contract carriers, and private carriers subject to the Department of Transportation Act. These regulations are quite thorough with regard to safety aspects of the truck; however, they might be further supplemented by the recommendations made by the USAIA standards which are applied to passenger vehicles.

FIGURE 8.1

Model #1 -- CALCULATION OF NUMBER OF PERMANENT STATIONS

	AUTOMOBILES	40% REINSPEC.	TOTAL INSPECTION	LANES
BALTIMORE CITY	280,320	112,000	392,320	12
BALTIMORE COUNTY	359,705	143,882	503,589	16
ANNE ARUNDEL	191,286	76,514	267,800	8
MONTGOMERY	375,422	150,169	525,591	16
PRINCE GEORGES	492,560	197,024	689,584	22
HOWARD	97,240	38,869	136,136	4
CARROLL	36,772	14,709	51,481	2
ALLEGANY GARRETT	43,553	17,421	60,974	2
CECIL HARFORD	88,423	35,369	123,792	4
FREDERICK WASHINGTON	93,770	37,508	131,278	4
CALVERT CHARLES ST. MARYS	63,820	25,528	89,348	3
CAROLINE KENT QUEEN ANNES TALBOT	36,867	14,747	51,614	2
DORCHESTER SOMERSET WICOMICO WORCESTER	54,595	21,838	76,433	3
TOTALS	2,214,333	885,578	3,099,940	98

1. 32,000 -- Cars/lane/year
2. 35,000 -- Trucks/lane/year [Note: In calculating the number of lanes, 20% fleet inspection was considered.]
3. Total lanes does not include diagnostic lanes of which one will be included in each large center.

FIGURE 8.1

Based on 1980 Projections

TRUCKS	40% REINSPEC.	TOTAL INSPECTION	LANES	TOTAL LANES	CENTERS
43,800	17,520	61,320	2	14	3
35,970	14,388	50,358	2	18	4
26,300	10,520	36,820	1	9	2
27,730	11,092	38,822	1	17	4
50,950	20,380	71,330	2	24	5
13,700	5,480	19,180	1	5	1
6,895	2,759	9,653	1	3	1
18,666	7,466	26,132	1	3	1
29,474	11,790	41,264	1	5	1
31,257	12,503	43,760	1	5	1
23,604	9,442	33,046	1	4	1
20,738	8,295	29,033	1	3	1
29,397	11,759	41,146	1	4	1
358,481	143,393	501,874	16	114	26

FIGURE 8.2 MODEL #2

CALCULATION OF NUMBER OF PERMANENT STATIONS & MOBILE UNITS

	AUTOMOBILES	40% REINSPEC.	TOTAL INSPEC.	LANES[1]
BALTIMORE CITY	280,320	112,000	392,320	12
BALTIMORE COUNTY	359,705	143,882	503,589	16
ANNE ARUNDEL	191,286	76,514	267,800	8
MONTGOMERY	375,422	150,169	525,591	16
PRINCE GEORGES	492,560	197,024	689,584	22
HOWARD	97,240	38,869	136,136	4
CARROLL	36,772	14,709	51,481	2
TOTAL PERMANENT	1,833,305	733,167	2,566,501	80

	AUTOMOBILES	40% REINSPEC.	TOTAL INSPEC.	MOBILE UNITS[2]
ALLEGANY GARRETT	43,553	17,421	60,974	3
CECIL HARFORD	88,423	35,369	123,792	5
FREDERICK WASHINGTON	93,770	37,508	131,278	5
CALVERT CHARLES ST. MARYS	63,820	25,528	89,348	4
CAROLINE KENT QUEEN ANNES TALBOT	36,867	14,747	51,614	2
DORCHESTER SOMERSET WICOMICO WORCHESTER	54,595	21,838	76,433	4
TOTAL MOBILE	381,028	152,411	533,439	23
TOTAL	2,214,333	885,578	3,099,940	103

1. 32,000 -- cars/lane/year
2. 35,000 -- trucks/lane/year *Inspection Centers

FIGURE 8.2

TRUCKS	40% REINSPEC.	TOTAL INSPEC.	LANES [2]	TOTAL LANES	
43,800	17,520	61,320	2	14	(3)*
35,970	14,388	50,358	2	18,	(4)
26,300	10,520	36,820	2	10	(2)
27,730	11,092	38,822	2	18	(4)
50,950	20,380	71,330	3	25	(5)
13,700	5,480	19,180	1	5	(1)
6,895	2,758	9,653	1	3	(1)
205,345	82,138	287,483	13	93	(20)
TRUCKS	40% REINSPEC.	TOTAL INSPEC.	LANES	TOTAL LANES	
18,666	7,466	26,132	1	4	
29,474	11,790	41,264	2	7	
31,257	12,503	43,760	2	7	
23,604	9,442	33,046	1	5	
20,738	8,295	29,033	1	3	
29,397	11,759	41,156	1	5	
153,136	61,255	214,391	8	31	
358,481	143,393	501,874	21	124	

MODEL NO. 2

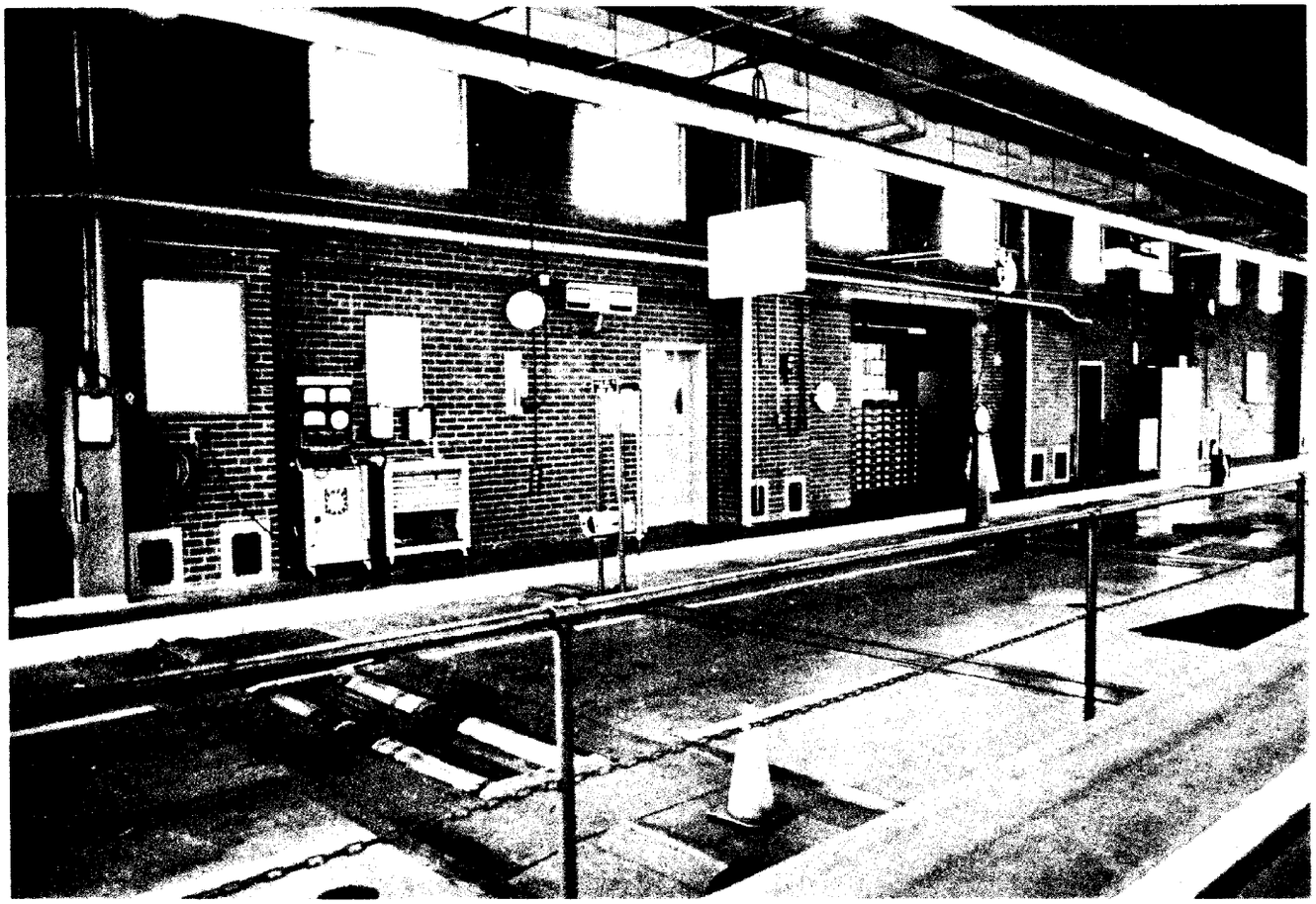
Description:

Model No. 2 is a combination system of permanent centers and mobile inspection units. The permanent centers would be located in those counties where the population density could easily be accommodated by one large inspection center. The mobile units, each one lane in capacity, would be stationed throughout the State to handle the outlying areas where the population density is substantially less.

The permanent stations can be integrated with the other State functions of motor vehicle registration, driver testing, and perhaps the district court operations; however, the mobile units would be used strictly for vehicle safety inspection. They may be assembled to operate near a regional MVI office to facilitate the convenience of one-stop motor vehicle business.

The PMVI lanes will contain the same equipment as in Model No. 1. The total time for inspection and the number of lane personnel in the permanent stations are identical to Model No. 1.

For counties which do not have a large enough vehicle population to warrant a permanent motor vehicle inspection station, a mobile facility would be utilized. Assembled as a semi-permanent station at pre-determined locations within the county, the mobile unit would inspect vehicles in the area with the potential to move on short notice to other areas if needed. It could most easily be stationed in a large parking lot or shopping center complex to handle the county population of vehicles. It would be desirable to provide shelter for inspection during the winter months or during rainy weather.



9
PROPOSED SYSTEM

PROPOSED SYSTEM — MODEL NO. 3

Model No. 3 is a refinement of Models No. 1 and No. 2. Two alterations were made: first, the inspection lane was reduced in length to accommodate three working stations instead of four; and second, some centers were scheduled to operate on a 40-hour week and others on a 60-hour week.

Permanent inspection stations were located throughout the State to facilitate a coordinated effort and convenience to the motorists. Because of the variations in registration density for different counties, 12 of the 19 regional centers will operate their inspection unit on the 60-hour schedule.

In order to make full use of manpower in the 60-hour centers, two centers should be coordinated together in the following manner:

Center 1 Crew A (Mon.- Thurs.) 40 hours per week @ 10 hr/day for 4 days.
Crew B (Fri-Sat.) 20 hours per week @ 10 hr/day for 2 days.

Center 2 Crew B (Mon.-Tues.) 20 hours per week @ 10 hr/day for 2 days.
Crew C (Wed.- Sat.) 40 hours per week @ 10 hr/day for 4 days.

Figure 9.1 shows the general location of the nineteen regional centers, their hours of operation, and the centers which might be coordinated together to utilize available manpower.

To maximize space utilization, the inspection lanes were reduced in length from 120 feet in Models No. 1 and No. 2 to 90 feet for Model No. 3. The inspection operations were rearranged to accomodate the three station layout.

The subsequent sections of this report are based on the development of Model No. 3.

COSTS

Personnel

It is estimated that the following personnel will be needed at the inspection centers:

MOTOR VEHICLE INSPECTION

ANNUAL FIELD PERSONNEL COSTS

Class	Grade	Salary
Motor Vehicle Inspector V (Center Manager)	11	$10,584
Motor Vehicle Inspector IV (Assistant Manager)	10	9,800
Motor Vehicle Inspectors III (Supervisors)	9	8,401
Motor Vehicle Inspectors II (Diagnostic Technicians)	8	7,778
Motor Vehicle Inspectors I (Lane Inspectors)	7	7,101
Maintenance Mechanic III	6	6,667
Office Assistant III (Lead Clerk)	4	5,715
Office Assistants II (Clerks)	3	4,899
Custodian	1	4,000*

*Estimate

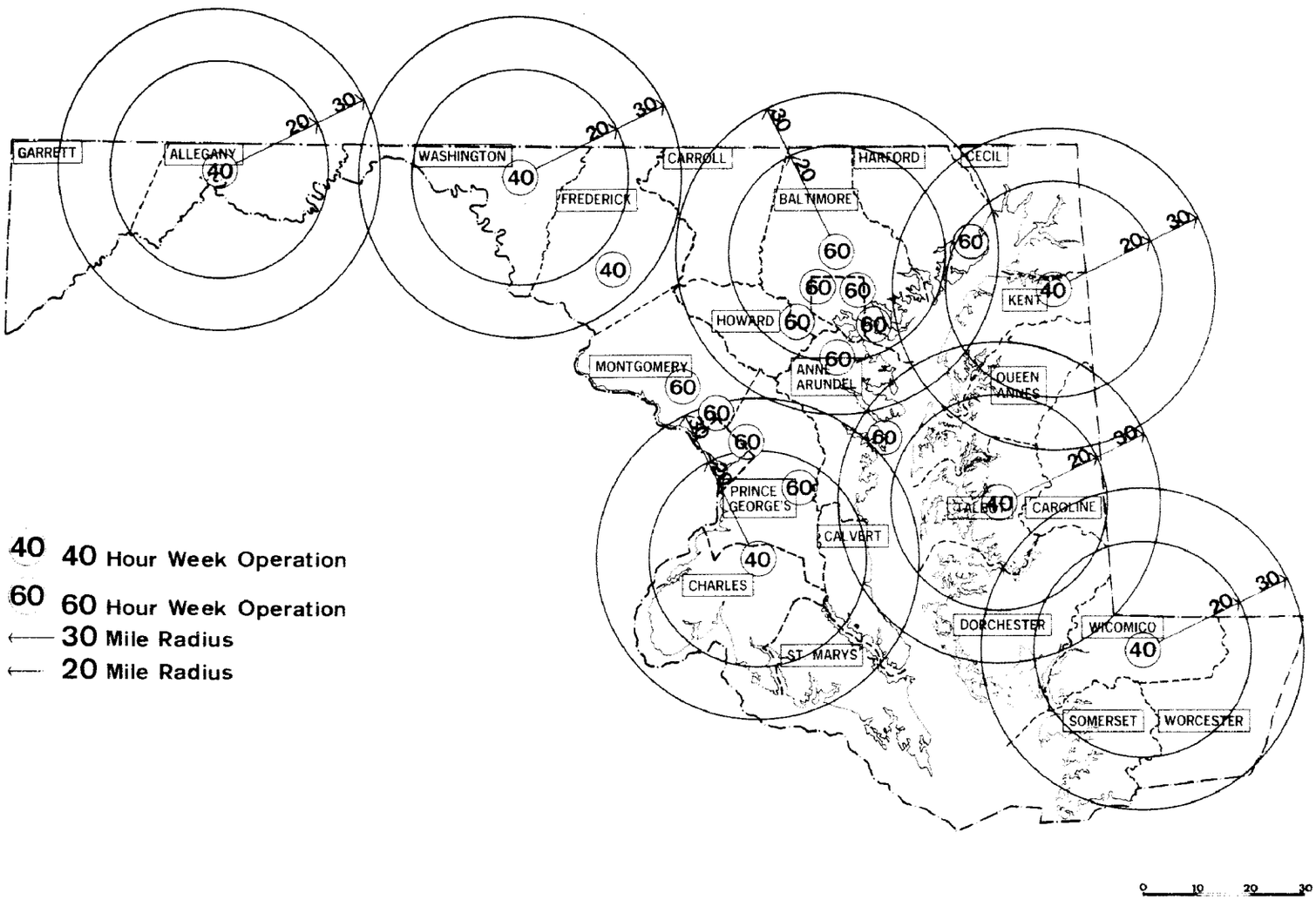
Cost figures are annual average salary for a standard 8-hour day based on January, 1972 expected salary levels in Maryland. These salary figures do not include the 17% personnel burden.

Five or six (possibly more) mechanics will be needed to keep the inspection equipment in working order. The station assistant managers will phone or send in requests for repair of equipment which will be turned over to the mechanics. There should also be a planned schedule of preventive maintenance so that all equipment is checked and cleaned once a year by a qualified mechanic.

FIGURE 9.1 **MODEL 3** REGIONAL CENTERS

STATION	HOURS	LANES*	MVA PERSONNEL	DISTRICT COURTS	INSPECTION PERSONNEL	INSPECTION PERSONNEL SALARY
Cumberland	40	3	19	2 courts	16	$ 138,488
Hagerstown	40	3	19	2 courts	16	138,488
Frederick	40	3	19	2 courts	16	138,488
Timonium	60	6	53	3 courts	45	396,060
Essex-Dundalk	60	6	53	3 courts	45	396,060
Catonsville	60	4	53	3 courts	33	289,314
Aberdeen (Bel Air)	60	4	19	1 court	33	289,314
Galena (Elkton)	40	2	19	(2 courts)	12	102,214
Easton (Centerville)	40	4	19	(1 court)	16	138,488
Salisbury	40	3	19	NONE	16	138,488
Waldorf	40	5	19	(1 court)	26	227,980
Upper Marlboro	60	7	53	3 courts	51	448,716
Hyattsville	60	7	53	3 courts	51	448,716
Rockville	60	6	53	5 courts	48	413,612
Silver Spring	60	7	53	1 court	51	448,716
Annapolis	60	4	19	2 courts	33	289,314
Glen Burnie	60	4		2 courts	33	289,314
Baltimore City (East)	60	5	53	(3 courts)	39	341,970
Baltimore City (West)	60	5	53	(3 courts)	39	341,970
TOTALS		87	648		619	$5,415,710

*Includes 1 truck lane per center



PMVI REGIONAL CENTER LOCATIONS
MODEL No. 3

FIGURE 9.2

FIGURE 9.3

Center	No. Ctrs.	Employee Positions	No. Emp.	Grade	Salary	17% Adjusted	Salary Total
2-lanes (1 auto-1 truck) Galena (40 hrs.)	1	Motor Vehicle Inspector-IV (Center Manager)	1	10	$ 9,800	1666	11,466
		Motor Vehicle Inspector-III	2	9	8,401	1428	19,658
		Motor Vehicle Inspector I (Auto & Truck Inspector)	6	7	7,201	1224	50,550
		Motor Vehicle Inspector-II	2	8	7,778	1322	18,200
		Custodian (20 hrs. per week)	1	1	2,000	340	2,340
		TOTAL	**12**				**102,214**
3-lanes (2 auto-1 truck) (40 hrs.) Salisbury Cumberland Frederick Hagerstown Easton	5	Motor Vehicle Inspector-IV	1	10	$ 9,800	1666	11,466
		Motor Vehicle Inspector-III	3	9	8,401	1428	29,487
		Motor Vehicle Inspector-II	2	8	7,778	1322	18,200
		Motor Vehicle Inspector-I	9	7	7,201	1224	75,825
		Custodian (30 hrs. per week)	1	1	3,000	510	3,510
		TOTAL	**16**				**138,488**
4-lanes (3 auto-1 truck) Catonsville Aberdeen Annapolis Glen Burnie (60 hrs.)	4	Motor Vehicle Inspector-V	1	11	10,584	1799	12,383
		Motor Vehicle Inspector-IV (Asst.Manager)	1	10	9,800	1666	11,466
		Motor Vehicle Inspector-III	4	9	8,401	1428	39,316
		Motor Vehicle Inspector-II	2	8	7,778	1322	18,200
		Motor Vehicle Inspector-I	15	7	7,201	1224	126,375
		Office Assistant II	1	3	4,899	832	5,731
		Custodian	1	1	4,000	680	4,680
		TOTAL	**26**				**227,980**

FIGURE 9.3

Motor Vehicle Inspection Field Staff

Center	No. Ctrs.	Employee Positions	No. Emp.	Grade	Salary	17% Adjusted	Salary Total
5-lanes (4 auto-1 truck)	3	Motor Vehicle Inspector-V	1	11	$ 10,584	1799	12,383
Baltimore City (60 hr.)		Motor Vehicle Inspector-IV	1	10	9,800	1666	11,466
		Motor Vehicle Inspector III	5	9	8,401	1428	49,145
		Motor Vehicle Inspector-II	2	9	7,778	1322	18,200
Waldorf (40 hrs.)		Motor Vehicle Inspector-I	15	7	7,201	1224	126,375
		Office Assistant-II	1	3	4,899	832	5,731
		Custodian	1	1	4,000	680	4,680
		TOTAL	**26**				**227,980**
6-lanes (5 auto-1 truck)	3	Motor Vehicle Inspector-V	1	11	10,584	1799	12,383
		Motor Vehicle Inspector-IV	1	10	9,800	1666	11,466
Timonium Essex Rockville (60 hrs.)		Motor Vehicle Inspector-III	6	9	8,401	1428	58,974
		Motor Vehicle Inspector-II	2	8	7,778	1322	18,200
		Motor Vehicle Inspector-I	18	7	7,201	1224	151,650
		Office Assistant-III	1	4	5,715	972	6,687
		Custodian	1	1	4,000	680	4,680
		TOTAL	**30**				**264,040**
7-lanes (6 auto-1 truck)	3	Motor Vehicle Inspector-V	1	11	10,584	1799	12,383
Upper Marlboro Hyattsville Silver Spring (60 hrs.)		Motor Vehicle Inspector-IV	1	10	9,800	1666	11,466
		Motor Vehicle Inspector-III	7	9	8,401	1428	68,803
		Motor Vehicle Inspector-II	2	8	7,778	1322	18,200
		Motor Vehicle Inspector-I	21	7	7,201	1224	176,925
		Office Assistant-III	1	4	5,715	972	6,687
		Custodian	1	1	4,000	680	4,680
		TOTAL	**34**				**299,144**

The D. C. Inspection system has no full time mechanics to repair equipment. They rely upon senior inspectors/mechanics to keep the inspection equipment in daily working order. Once a year they close each station for a week to clean and repair equipment, paint new lines, and in general spruce up the station. All of D. C.'s lane inspectors have mechanical experience and they find that after several years at the station they are capable of repairing almost all of the equipment. If Maryland's inspectors are less than qualified mechanics, they may find that this type of repair program is impossible.

Equipment

Several motor vehicle inspection equipment manufacturers were contacted to determine available equipment which could be used and estimated costs of the equipment. Equipment was viewed in operation at the District of Columbia Inspection Station, a local diagnostic center, and at the inspection station in Dover, Delaware.

The equipment was chosen on the basis of performance, cost, time involved in use, and safety considerations. The automobile inspection lane equipment is similar to that used in District of Columbia, New Jersey, and Delaware stations, except that a dynamic brake tester has been suggested in place of the static brake tester. The dynamic brake tester, is a more accurate test of the car's braking ability and performance since it more closely simulates on-the-road braking conditions.

It was determined that, in addition to the regular testing lane, a diagnostic lane should be provided in the larger stations, as an option for motorists who want the full diagnostic test. The chassis dynamometer, which simulates road testing of the auto in the shop, can be used in conjunction with the brake analyzer to test exhaust emissions at speeds of up to 50 miles per hour, within a matter of minutes.

The costs cited in Figure 9.4 are representative of equipment of that type, although in most cases the higher cost was listed. Prices listed are for 1970-71, and can be expected to rise 10-15% in the next several years. This, however, would be offset by the cost reduction granted by manufacturers on a volume sale of equipment.

The cost of the truck inspection lane equipment is similar to that for a car lane, in spite of the fact that the less sophisticated static brake tester is used.

The total cost of $35,750 for a lane of diagnostic equipment, including ventilation, exhaust disposal, and installation compares favorably with the estimated cost of a lane of similar equipment sited in a feasibility study done in Wisconsin.[1]

1. Wisconsin's diagnostic equipment cost/lane was $32,500, and included more equipment than suggested for Maryland. "Feasibility Studies for State Owned Vehicle Inspection Centers, 1969," State of Wisconsin, DOT, Division of Motor Vehicles, p. 23.

FIGURE 9.4

MOTOR VEHICLE INSPECTION

EQUIPMENT COSTS

Automobile Inspection Lane

Number	Class	Cost
1	Headlight Tester	$ 380
2	Scuff Detector (Wheel Alignment)	780
3	Dynamic Brake Tester	7,950
4	Front End Lift	3,250
5	Ventilation & Exhaust Disposal System	3,270
6	Installation	2,500
	TOTAL	$18,130

Automobile Diagnostic Lane

Number	Class	Cost
1	Chassis Dynamometer/ Brake Analyzer	$14,040
2	Dynamic Front Wheel Alignment	10,560
3	Engine Performance Tester- Emission Tester	5,000
4	Diagnostic Rack & Hoist Unit	3,270
5	Headlight Tester	380
6	Installation	2,500
	TOTAL	$35,750

Truck Inspection Lane

Number	Class	Cost
1	Static Brake Tester	$ 7,790
2	Headlight Tester	380
3	Scuff Detector	780
4	Front End Lift	3,250
5	Ventilation & Exhaust Disposal System	3,260
6	Installation	2,500
	TOTAL	$17,960

Land

Land cost estimates are based upon representative 1971 land prices in Maryland. Land in Montgomery County the most expensive area, might cost about $240,000 per acre; while industrial park land in Baltimore County might be as low as $20,000 per acre. In the more rural counties, like Queen Anne and Garrett, land prices are substantially lower.

Based upon an estimate of 5 acres per large regional center, the land costs could go as high as $1.5 million in an urban commercial area in Rockville, assuming that the land could be purchased in that area. On the other hand, land costs for a 6-lane regional center in an industrial park[2] in Baltimore County might be as low as $100,000. Since it would be neither feasible nor desirable to build stations in the middle of downtown Rockville or in an uninhabited area, a median land price of $125,000 for "urban commercial" and $10,000 for "industrial park-rural" have been selected for computational purposes. It is impossible to estimate at this time what total land costs would be, since station locations have not been decided upon, nor has the extent to which state properties may be used been determined.

2. In some areas, water and sewer lines are installed.

FIGURE 9.5

LAND COST ESTIMATES[3]

County	Approximate per sq. acre		Approximate per. sq. ft.	
	Low	High	Low	High
Montgomery County				
Bethesda	Not Available		$15.00	$20.00
Rockville Pike	$210,000	$240,000	6.00	7.00
P. G. County				
Rt. 495 & Rt. 1	157,000	175,000	4.50	5.00
Rt. 1 (up the road)	68,000		1.95	
Industrial Parks	52,000	70,000	1.50	2.00
Baltimore County				
Industrial Park (Cockeysville)	20,000	30,000		
Near major roads zoned commercially	10,000	15,000		
Queen Anne County				
Rural, farm area outside Easton	600	10,000		
Garrett County				
Rt. 219 Commercially zoned		10,000		
Rt. 135 Commercially zoned	4,500			

3. Survey by Motor Vehicle Administration, September 1971.

FIGURE 9.6

1971 Estimated Program Costs

For PMVI System Only

Capital Costs[1]

Building and Sitework[2]	$ 9,661,000
A & E fee. . .(Based on Maryland Type B Fee schedule	473,000
Land Estimates[3]	1,877,000
Inspection Equipment and Installation[4]	1,574,080
TOTAL	$13,585,080

Annual Operating Costs

PMVI Salaries	$5,415,710
Amortization Costs	
Transportation Bonds (15 year)@ 6%	1,398,712
Revenue Bonds (40 year) @ 6%	(902,859)
Maintenance and Overhead[5]	532,972
TOTAL	$7,347,394
	(6,851,541)

Annual Inspection Costs Per Vehicle

1975 Projection (2,350,000 vehicles)	
Transportation Bonds	$3.12/vehicle
Revenue Bonds	2.91/vehicle
1980 Projections (2,700,000 vehicles)	
Transportation Bonds	$2.72/vehicle
Revenue Bonds	2.54/vehicle

1. Not included in estimate are furnishing, furniture and office equipment and allocations for diagnostic stall. (October, 1971 figures)
2. Building allocations of $415,872 for diagnostic excluded.
3. Include allocation for diagnostic stall, approximately 1% of total area.
4. Diagnostic equipment not included in estimate.
5. Figured on the basis of $1.20/s.f. of building space and $.43/s.f. of site area including 10% green space.

FIGURE 9.7

Diagnostic Fee

Capital Costs

Building allocation	$ 415,872
Diagnostic equipment and Installation	679,250
Land allocation	(calculated in PMVI costs)
TOTAL	$1,095,122

Annual Operating Costs

Salaries	345,800
Amortization at 6%	
Transportation Bonds	112,754
Revenue Bonds	(72,782)
Maintenance & Overhead	13,132
TOTAL	$471,686
	(431,714)

Diagnostic Fee per Vehicle

Assuming one diagnostic test per hour at each center

12 centers @ 60hr/wk = 720 hours or inspections
7 centers @ 40hr/wk = 280 hours or inspections
Total Inspections per Week = 1,000
X 50 wk/yr

Total Inspections per Year = 50,000
Assuming a 70% utilization, Total Inspections = 35,000/year

Therefore,

$$\text{Total Annual Operating Costs} = \frac{\$471,686}{35,000} = \$13.50/\text{inspection}$$

Diagnostic Fee = $13.50

FIGURE 9.8

Annual Leasing Cost

For the

Maryland District Courts

LOCATION	FACILITY	BUILDING COST[1]	LAND COST[2]	TOTAL	LEASING COST[3]
Galena	Two courts	$367,000	$ 15,000	$ 382,000	$ 45,330
Easton	One court	238,000	10,000	248,000	29,334
Cumberland	Two courts	367,000	15,000	382,000	45,330
Hagerstown	Two courts	367,000	45,000	412,000	48,419
Frederick	Two courts	367,000	45,000	412,000	48,419
Aberdeen	One court	238,000	15,000	253,000	29,848
Annapolis	Two courts	367,000	30,000	397,000	46,875
Cantonsville	Three courts	506,000	60,000	566,000	66,075
Waldorf	One court	238,000	10,000	248,000	29,334
Baltimore City No. 1	Three courts	506,000	300,000	806,000	90,785
Baltimore City No. 2	Three courts	506,000	300,000	806,000	90,785
Essex	Three courts	506,000	60,000	566,000	66,075
Timonium	Three courts	506,000	60,000	566,000	66,075
Rockville	Three courts	859,000	750,000	1,609,000	181,662
Silver Spring	One court	238,000	175,000	413,000	46,332
Upper Marlboro	Three courts	506,000	40,000	546,000	64,016
Hyattsville	Three courts	506,000	300,000	806,000	90,785
Glen Burnie	Two courts	367,000	45,000	412,000	48,419

1. Building costs are October 1971 estimates by Skidmore, Owings & Merrill
2. Land costs are estimates of September 1971 made by Maryland MVA
3. Annual leasing costs reflect amortization costs and overhead. Amortization costs were figured on the basis of transportation bonds at 6% interest on a 15 year debt period.

ECONOMIC BENEFITS OF IMPLEMENTATION OF THE PMVI SYSTEM

Job Impact

One of the most relevant economic impacts to accrue to the State through implementation of the PMVI station system will be in the form of new jobs. Included in the job creation impact category are the indirect employment effects attributable to the PMVI system. Direct jobs created by the PMVI system produce increased spending and, thereby, generate other jobs within the local economy. The procedure used to calculate these indirect employment effects was multiplying the number of direct jobs by a factor that varied according to the population of the municipality in which the station is located. The factors used ranged from a 1.3 for municipalities with a population over 1,000,000 to a low of 0.7 for those areas with a population of 25,000 to 100,000 people.[4]

The job impact for the PMVI stations system, Model No. 3, includes an estimated 619 net new jobs, (See Figure 9.9). In applying the indirect employment factor, the sub-total of new jobs reaches 1,246. In adding the estimated new jobs obtained through the integration of the Motor Vehicle Administration offices, the total new job impact is 2,546. The estimated levels of employment input are considered conservative rather than too high. Not counted in the job impact analysis are the State Police and an undetermined number of central administration personnel who could be added to coordinate the new program.

Another employment impact will occur within the private sector beyond the indirect employment spin-off discussed earlier. At a 40 percent stabilized reinspection rate (discounting those trucks in fleet ownership), there will be approximately 1,026,000 motor vehicles which will have to undertake some repair to pass inspection. Assuming a mechanic works 2,000 hours a year and would spend an average of one hour repairing a motor vehicle, approximately 500 mechanic jobs will be supported by the PMVI program using 1980 motor vehicle figures.[5]

Although it can be argued that the existing market supply of mechanics could absorb a certain proportion of this extra repair need, and a number of mechanics are lost in the private market which exists expressly to inspect motor vehicles, there is an estimated gain of over 400 mechanics in the private market with implementation of the PMVI program.

Very few mechanics in the garages licensed to inspect motor vehicles are hired for that express purpose. Rather, they take time away from other repair duties to provide the service.

Economic Quality of New Jobs

An attraction of the new jobs beyond their sheer numbers is the economic quality of these jobs. The basis in determining economic quality here includes:

1. The stability of the new employment;
2. The potential growth;
3. The dispersion of the new jobs throughout the State; and
4. The potential for hiring the unemployed.

Although governments try to invest their capital improvement funds in developments to attract new, stable industry, the economic stability in the new jobs created often is not what it should be. In this case, the employers are two state government departments, and the new jobs rank as high as any could, due to their dependability. There is little chance that the jobs will not exist once they are developed. Actually, these jobs will grow in number. As the number of registered motor vehicles increases throughout the State, so will the need for more inspection. While the system is designed for a motor vehicle registration estimated in 1980 numbers, as the motor vehicles increase beyond this level, added shifts or other arrangements will be called for to accommodate the new demand. The jobs are spread throughout the State affording new job opportunities in the rural areas, as well as the heavily populated, and afford employment opportunities in their respective municipalities which are not vulnerable to cyclical changes in the economy.

4. These factors were developed from the E.J. Ullman and M.F. Dacey paper "The Minimum Requirements Approach to the Urban Economic Base," published in the proceedings of the 1960 IGU Symposium.

5. The 2000 - hour work time per year, per mechanic is based on a 40 - hour week for 52 weeks a year, using 1970 Motor Vehicle figures.

Finally, these new jobs afford many positions which can be filled through training unemployed people. As discussed in the next section, there are a number of Federal programs which can be utilized to supply funds for training the unemployed. Many of the inspection stations and the MVA jobs can be filled with people who have had little or no previous training in related tasks. The job training will be attractive to the people involved because the positions actually exist, there is an opportunity to build a career, and the jobs offer stable employment.

EQUITABLE DISTRIBUTION OF MOTOR VEHICLE REPAIR AND MAINTENANCE

Dollars

It appears that with the implementation of the PMVI stations, there will be a more equitable distribution around the State of dollars expended for motor vehicle repairs and maintenance. The economic benefit attributed here to the PMVI system is based on two assumptions: (1) a 40 percent stabilized, reinspection rate of all motor vehicles inspected,[6] and (2) motor vehicle owners exercise free choice in determining who is to repair and equip their vehicles.

6. A 20 per cent discount was applied to truck reinspection and subsequent repair due to fleet operation effect and the owner's control of repair and maintenance expenditures - - 1980 MV's.

FIGURE 9.9 **EMPLOYMENT IMPACT ANALYSIS** MODEL #3

NO. STATIONS	MUNCIPALITY	PMVI NET NEW JOBS	INDIRECT EMPLOY. FACTOR	SUB-TOTAL	MVA NET NEW JOBS	INDIRECT EMPLOY. FACTOR	SUB-TOTAL	**TOTAL NEW JOBS**
1	Cumberland	16	.7	27	19	.7	32	**59**
1	Hagerstown	16	.8	29	19	.8	34	**63**
1	Frederick	16	.8	29	19	.8	34	**63**
1	Timonium	45	1.0	90	53	1.0	106	**196**
1	Essex-Dundalk	45	1.0	90	53	1.0	106	**196**
1	Catonsville	33	1.0	66	53	1.0	106	**172**
1	Aberdeen	33	.8	59	19	.8	34	**93**
1	Galena	12	.8	22	19	.8	34	**56**
1	Easton	16	.7	27	19	.7	32	**59**
1	Salisbury	16	.7	27	19	.7	32	**59**
1	Waldorf	26	.7	44	19	.7	32	**76**
1	Upper Marlboro	51	1.3	117	53	1.3	122	**239**
1	Hyattsville	51	1.3	117	33	1.3	122	**239**
1	Rockville	48	1.0	96	53	1.0	106	**202**
1	Silver Spring	51	1.0	102	53	1.0	106	**208**
1	Annapolis	33	1.0	66	19	1.0	28	**94**
1	Glen Burnie	33	1.0	66	0	1.0	0	**66**
1	Baltimore City (East)	39	1.2	86	53	1.2	117	**203**
1	Baltimore City (West)	39	1.2	86	53	1.2	117	**203**
19	TOTAL JOBS	619	---	1,246	648	---	1,300	**2,546**

Again, utilizing a 40 percent stabilized reinspection rate, there will be approximately 1,026,000 motor vehicles which will have to undertake some repair, or purchase some equipment to pass inspection.

According to recent statistics, the average annual repair, maintenance and tire replacement costs for an automobile approximates $25.00. Applying this average figure to only those motor vehicles which must undergo reinspection each year, an estimated $25,000,000 is expended. It is argued that under a public system of inspection, this $25 million a year will be more equitably distributed among garage and service stations than it would if selected private garages were undertaking the inspection.

One of the complaints registered on numerous occasions under the present system with licensed dealers, is that the motor vehicle owner has to have his vehicle repaired at the garage that undertakes the inspection. The complaints have suggested seemingly unnecessary repair, and in most instances, the owner has no choice to give the business to another garage.

Centralized Motor Vehicle Services

With the adoption of a State-run PMVI station system there would be advantages to the State and to the public in centralizing the motor vehicle service needs.

Advantages to the State would be appreciated in terms of the economics of scale realized through centralizing the costs of motor vehicle services in terms of land, buildings, equipment, and personnel. In addition, unquantifiable gains would be realized through coordination of State motor vehicle services.

The public gain has been accounted for previously, with the exception of time savings which would be appreciated with centralized service.

MANPOWER REQUIREMENTS – JOB TRAINING OPPORTUNITIES

Background

In the ten years of Federal involvement in manpower and training programs, a number of approaches have been utilized to help equip under-educated and unskilled persons for roles in an urban technological society.

With the growing recognition that there were special training needs for increasingly larger numbers of hard-core unemployed individuals, a wide variety of Federal programs were initiated. The Manpower Development and Training Act was one of the first major programs to address the problem, soon to be followed by a variety of programs authorized under Economic Opportunity legislation.

Accompanying the growing reliance on the manpower approach to solving problems of poverty was the development of a new awareness of the need for career-oriented employment, not merely employment per se. Simultaneously with this awareness was the realization that thousands of employment opportunities did exist, or would shortly come into being in the public service area.

The first Federal recognition of this concept came in the new careers legislation, which provided training for neighborhood persons, largely in health, education, and welfare fields. A major requirement of this legislation was the necessity to build into the program a career ladder through which the trainee would progress from entry level employment upward to a higher level of income and responsibility, as he received more training, experience, and education.

The Growing Need for Public Service Careers

As the nation's economy has expanded, various levels of government have been called upon to provide services at an increasingly accelerated pace. Urbanization continues to draw population into the metropolitan areas. In 1960 over 60 percent of the population lived in metropolitan areas (50,000 population or more); in 1970 over 68 percent lived in metropolitan areas. These population shifts put new burdens on local, county, and state governments which must expand and adjust.

The public sector is quickly becoming not only the employment resource with the fastest rate of growth within the economy, but also the employer with the greatest potential need.

Public Sector Job Training Programs

In Maryland, as elsewhere, accompanying the high concentration of population within certain counties and metropolitan areas is a relatively high unemployment level. Often accompanying the greater public service needs and demands in these areas is the lack of funds to carry out the needed and increasing public services.

The establishment and implementation of a job training program in coordination with the development of the periodic motor vehicle inspection stations could ease some of the economic and social strains within the counties and metropolitan areas receiving these stations.

Two such U.S. Labor Department programs which attempt to bring together the unemployed, and the work to be done in the public services area are the Public Service Career Program (PSC) and the New Emergency Employment Act, Public Employment Program (PEP). The PSC Program is designed to develop permanent employment for the disadvantaged in public service agencies. It also aims to stimulate possibilities for both entry level new employees and those who have been on the job for some time. The funding for the program is allocated between; (1) assistance to the individual; communication skills training, preparation for Civil Service tests, etc., (2) the institution; for reorganization of their job structuring and analysis of the job qualification requirements, etc., and (3) the environment; funds for assistance in transportation and/or day care, etc.

The Public Employment Program (PEP) of the Emergency Employment Act is specifically designed to place the unemployed in public service positions. There are two types of public positions which qualify for this Federal assistance; (1) public service positions which have not previously existed, (e.g., PMVI personnel), and (2) public service positions which were not filled due to the lack of local funds. The program pays salaries for up to two years with the local government contributing 10 percent at the outset and the entire salary after the two-year maximum Federal participation.

PEP has been authorized for the next two years at approximately 2.25 billion dollars. Advocates of the bill have recommended that the bill be extended or replaced in areas where unemployment does not fall below the six percent target level, over the next two years.[7] In some counties and metropolitan areas in Maryland this program could still be in effect at the time of staffing of the PMVI stations and MVA offices.

Clearly, there is a unique opportunity in the PMVI station program to train and hire the unemployed for many of the necessary staff positions.

At the time of the writing of this report, preliminary planning sessions have taken place to develop a comprehensive manpower training project for the PMVI center program. The principal recruits for this manpower project would include: (1) the hardcore unemployed recruited throughout the State, (2) legal offenders recruited and trained Statewide by the Maryland Department of Corrections, and (3) returned veterans of Vietnam, also recruited Statewide. The two Federal agencies contacted for basic funding would be the Labor Department and the Law Enforcement Assistance Agency. Steps are being taken to develop a project that will meet all the needs of the sponsoring agencies and participants involved. Training will take place well in advance of the opening of the centers.

Advance construction and opening of a prototype center to facilitate on-the-job training is strongly recommended. Utilizing State-owned vehicles, the prototype center will act as a system testing center as well as the key training facility with a secondary objective of improved start-up and program implementation of all nineteen centers. Training of personnel and center openings will be carefully phased throughout the State.

Enthusiasm has been expressed by all agency officials to be involved with the PMVI manpower training project. Further meetings are planned to develop this comprehensive manpower project with one objective being the design of the project in time for review by the State legislators along with the PMVI report.

7. Strong emphasis has been placed on the short-term design of this bill by the President. While local governments are being urged not to count on follow-up measures, there are many people in the Labor Department who believe that some extension or replacement bill will follow for those areas where high unemployment persists.

THE ECONOMIC BENEFITS AND COSTS OF A STATE-LICENSED INSPECTION SYSTEM

Estimated Program Costs

The obvious benefit of the State-licensed system for periodic motor vehicle inspection is the savings in capital expenditure. While the State-run PMVI system would mean a capital expenditure outlay of $13.6 million for Model No. 3,including land, the State-licensed system has no capital expenditures outlay for the State. On the other hand, the State would have to continue carrying the costs of leasing space for the expanding needs of the MVA facilities at an estimated annual cost for eleven MVA stations and one driver testing area of $361,300.[8]

While it could be argued that the job impact would be similar if the State-licensed stations would inspect the same number of motor vehicles, the distribution throughout the State would not be the same due to the loss of the coordinated MVA offices with the public PMVI system. As important, the State would not be in control of the inspection system, requiring a projected 125 State personnel to make periodic checks on the private stations. In addition, the State would lose the advantage of coordinated motor vehicle services.

Finally, the job training potential and distribution of jobs and service dollars would not be comparable under a State-licensed system. Although new jobs would be created under a State-licensed system and private employers can undertake training (with Federal assistance), the coordination of the training effort in the hands of many private garages (or dealers) would all but preclude hiring as many of the untrained and unemployed.

As mentioned earlier, with inspection and motor vehicle repair maintained in the hands of licensed garages, there will be less distribution throughout the State of repair and maintenance dollars and more complaints of unnecessary costs to the public.

ORGANIZATIONAL GUIDELINES

Administration

The principal consideration in determining the specific "managing agency," responsible for the Periodic Motor Vehicle Inspection (PMVI) Program, is that the administration be treated as a major function within the overall Motor Vehicle structure. The most effective management program is one in which all administration, supervision, and enforcement responsibilities for the inspection program are concentrated within a single agency.

Whether the Automobile Safety Enforcement Division continues to administrater the inspection program, or a new agency is designated within the Motor Vehicle Administration is a question to be resolved by the State. In any event, it is recommended that the State Police work closely with the administrative agency in spotting vehicles whose inspection times have elapsed, or whose defect-repair periods have expired. The on-the-road inspection of vehicles by State Police and the Safety Equipment Repair Order are still valuable aspects of a PMVI program in terms of maintaining vehicle safety.

Organization

The PMVI program should have one administrator who will direct the headquarters and field personnel. A typical PMVI organization chart is shown in Figure 9.10.

Headquarters Staff

The central administrative staff will vary depending upon the parent organization but would probably include the following personnel:

1. Adminsitrator
2. Deputy Administrator
3. Chief PMVI Enforcement Officer
4. Area supervisors
5. Equipment analysts
6. Automotive Engineers
7. Training Specialist

8. Figures obtained through discussion with MVA officals and calculations made on the number of square feet to be leased and reasonable leasing rates according to the stations location.

In addition, supporting staff will include clerks, bookkeepers, accountants, typists, stenographers, machine operators, and public relations specialists. The headquarters office could be organized along the following functional lines:

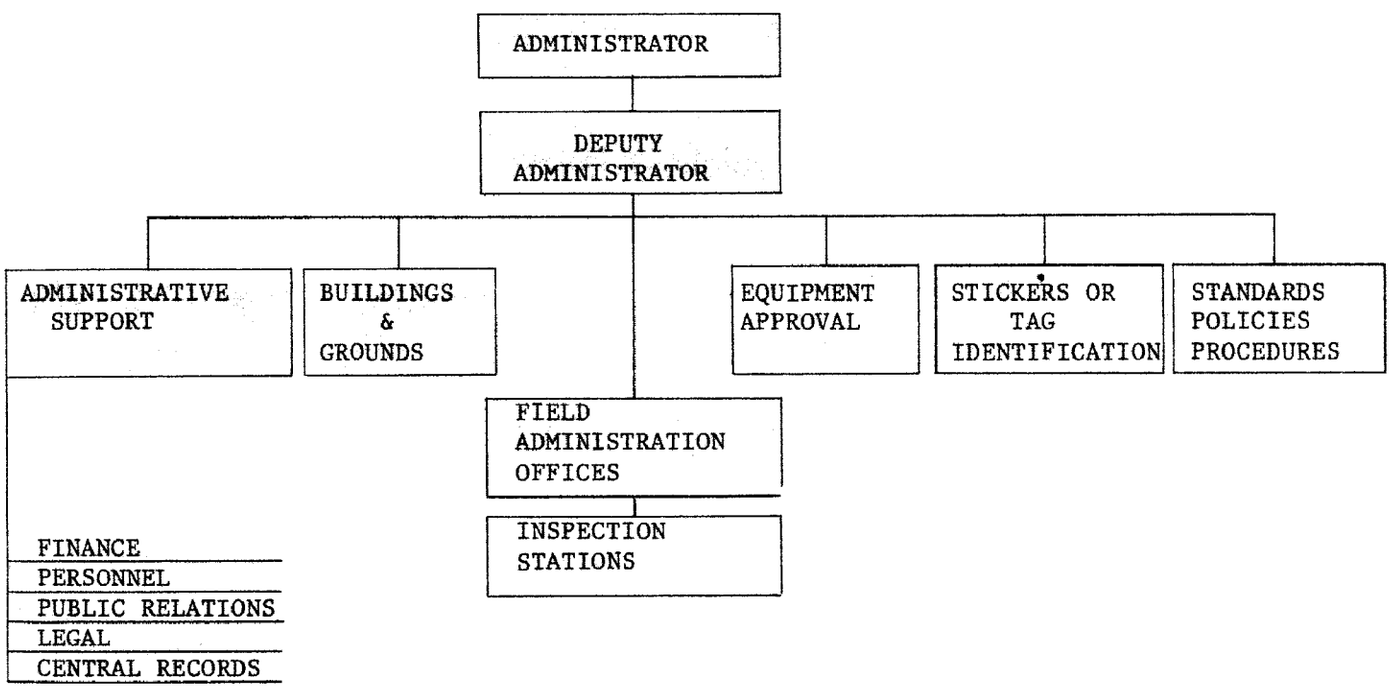
1. Office of Administrator
2. Equipment Approval
3. Sticker issuance Control
4. Policies and Procedures
5. Finance and Accounting
6. Personnel Recruitment and Training
7. Public Relations
8. Records
9. Legal
10. Land acquisition and facilities construction
11. Maintenance of buildings and grounds.[9]

Field Staff

The field staff should be carefully selected and well trained since they have the most frequent contact with the public. It is important that their inspections are quick, efficient, courteous, and professional. Therefore, they must be familiar with the items to be inspected, and the equipment they are using. The most frequent complaint about State-run PMVI systems is the lack of concern and knowledge displayed by inspectors. In order to attract and retain qualified staff, adequate compensation and opportunity for internal advancement should be provided.

9. See Management Manual for Motor Vehicle Inspection, by Insurance Institute for Highway Safety, January 1, 1968, Washington, D.C.

FIGURE 9.10 SAMPLE ORGANIZATION CHART FOR STATE-OPERATED MVI SYSTEM*



* Insurance Institute for Highway Safety, Management Manual for Motor Vehicle Inspection, Jan. 1, 1968, Washington, D. C. p. 211.6, Fig. 2.11.10

Following are some recommended job descriptions for administration and inspection personnel in the inspection centers. (Clerical positions have not been included in the job description, but are listed in the salary cost estimates.)

Inspection Station Personnel--Job Descriptions

1. Inspection Center Manager

   a. Plans, organizes, and supervises the inspection activities of the large center;

   b. Prepares reports on his station, as directed by the administrative agency;

   c. Assists the administrative agency in revising and updating vehicle inspection procedures;

   d. Responsible for insuring that inspections are carried out efficiently and correctly, and that equipment is maintained in good working order;

   e. Work with other department heads in the center to coordinate activities.

2. Assistant Manager

   a. In a large center, this person assumes the duties of the manager in his absence;

   b. Responsible for overseeing the lane supervisors and inspectors. Assigns personnel to lanes and trainees to work with experienced inspectors.

   c. Handles complaints and makes explanations to vehicle owners when necessary;

   d. Does a daily check of all inspection equipment and reports all necessary repairs to the mechanic;

   e. In a small center, acts as Station Manager and performs all duties of the position.

3. Vehicle Inspection Lane Supervisor

   a. In charge of one inspection lane for car or truck; gives daily assignments and instructions to inspectors;

   b. May check vehicle registration and licensing as well as the inspection card and replaces the sticker;

   c. Responsible for seeing that all inspection items have been checked on each vehicle inspection card;

   d. In a small station, does a daily check of all equipment, to insure it is in proper working condition, and reports needed repairs to the mechanic and undertakes the other duties of an assistant manager.

4. Lane Inspector (usually 3 men per lane)

   a. Performs the inspection of the vehicle; operates the inspection equipment, drives the vehicle, and punches inspection card;

   b. Attends a mandatory training period, after being hired and prior to going to work in the lane, to gain familiarity with the equipment and the inspection standards that are to be met.

5. Diagnostic Technician (A diagnostic bay will require 2 trained and experienced mechanics who are familiar with diagnostic equipment.)

   a. Will operate all diagnostic equipment and perform all necessary diagnostic tests;

   b. Participates in all experimental programs the department undertakes.

6. Mechanic (Each station should have an inspector or supervisor who is a qualified mechanic in addition to the headquarters staff of mechanics.)

a. Makes all needed repairs on equipment;

b. Does a periodic check of all equipment for cleaning and preventive maintenance.

Training Program

All center managers, assistant managers, supervisors, diagnostic technicians, and lane inspectors should be required to attend an initial training period.

The course work should include a thorough study of PMVI standards, purpose, objectives, the need for PMVI, procedures for making the inspection, and equipment used. Part of this training should take place on the job under the supervision of an experienced inspector. Trainees should be required to pass a written and mechanical examination before going to work at the inspection center. Additional training for managers, assistant managers, and supervisors might also include:

1. Enabling authority or legislation.
2. Organization of the PMVI division.
3. Role of the managers, supervisors, and inspectors.
4. PMVI division policies and procedures.
5. Reporting requirements, information system.
6. Planning and organizing work.

Inspection Procedure

The following inspection procedure is based on United States of America Inspection Standards and closely follows the system used in the District of Columbia, New Jersey, and Delaware. The lane has three "stops" or "stations" and requires an inspection team of four. It is recommended, for safety and expediency, that the owner leave the car at the first station and pick it up at the exit, leaving all driving inside the lane to the inspector.

As the car enters the station (or just prior to entering the inspection center if there is a waiting line), an inspector checks driver's license and vehicle registration (proof of ownership) to see that they are up to date and that information is consistent.

At the first "station", a visual inspection is made of all lights, directional signals, glass, windshield wipers, horn, seat belts, seats, and physical condition of the body.[10] The same inspector, while in the car, also checks brake pedal for excessive "play", parking brake, heater, and defroster. Simultaneously, another inspector is checking, from the outside, the following items: condition of lens of all lights, front and rear bumpers and fenders, hood and trunk latches, and body condition. With the hood open, he checks hydraulic brake fluid level, engine serial number, and any hoses and belts on the engine that appear to be leaking, or on the verge of breaking. Then the vehicle undergoes a headlight test for direction and intensity. Next, the inspector drives the car forward to the second station for the dynamic brake test. Here he tests the front wheel brakes for brake shoe action, lining contamination, driving tendency, brake effort, and balance. On those cars where the speedometer is driven by the front wheels, he checks speedometer accuracy. He then positions the car so the rear wheels are tested in a similar manner.

Following the completion of station No. 2 tests, the car is driven over a scuff detector plate in the floor to check wheel alignment, as it moves to the third station. The car is lifted in the front to check the under-vehicle condition. This inspection includes: shock absorbers, tire condition, exhaust system, hydraulic brake fluid and fuel system leaks, and springs. Checks are also made for looseness and wear in ball joints, front-end suspension, and steering. The old sticker is replaced by either the new sticker or a rejection sticker before the vehicle exits.

10. The inspector while inside the vehicle tests flooring to make sure it is sound.

FIGURE 9.11

GENERAL INSPECTION PROCEDURE

Vehicle Part Tested	How Test Conducted	Equipment Required
General exterior condition --- loose or damaged fenders, bumpers, broken glass, etc.	Visual	None
Rear Lights		None
Stop	Visual/Operate	
Tail	Visual/Operate	
Back up	Visual/Operate	Large Mirrors (optional)
Directional Signals	Visual/Operate	
Parking	Visual/Operate	
Emergency Flashers	Visual/Operate	
Front Lights		None
Directional Signals	Visual/Operate	
Parking	Visual/Operate	
Emergency Flashers	Visual/Operate	Large Mirrors (optional)
Headlights	Visual/Operate	
Aim or focus	Operate	Headlight Tester
Brightness	Operate	Headlight Tester
Windshield Wiper	Visual/Operate	None
Windshield Washer	Visual/Operate	None
Windshield Condition	Visual	None
Horn	Operate	None
Defroster	Operate	None
Rear & Side View Mirrors	Visual	None
Seat Belts	Visual	None
Glove Compartment/Door Latches	Visual/Operate	None
Brakes (Dyanamic Tests)		
Front Wheels		
Brake Shoe Action	Duplicate Road Brake Action	Dynamic Brake Analyzer
Lining Contamination	"	"
Diving Tendency	"	"
Brake Effort Balance		"
Rear Wheels	(Same Test as Front Wheels)	"
Speedometer Accuracy	Operate at Highway Speed	
Shock Absorbers (Front/Rear)	Visually for Leaks	Lift
Shock Absorbers (Front/Rear)	Bounce for Action	None
Tire Condition	Measure Tread depth, casing breaks	Lift and depth gauge
Muffler/Exhaust System	Visually for leaks & corrosion	Lift
Hydraulic Fluid	Visually for leaks	Lift
Fuel System	Visually for leaks	Lift

Ball Joints	Observe degree of loose-ness/Wear	Lift and Gauge
Front End Suspension	"	Lift
Steering		Lift
Springs	Visual for sag/breaks	Lift
Brake Assembly	Remove Wheel for visual check of linings, cylinders and drums	Lift & Impact Wrench
Wheel Alignment	Measure Alignment Angles	Dynamic Wheel Aligner
Camber	"	"
Caster	"	"
Toe-in	"	"
Turning Angle	"	"
Centered Steering	"	"

FIGURE 9.12

INSPECTION PROCEDURE AND TIMES

Visual Inspection	1 min.	Dynamic Brake Analysis	3 min.	Under Vehicle Inspection	1 min.
Headlight Test	1 min.			Administration	1 min.
Allowance #1	1 min.			Allowance #2	1 min.
STATION #1	3 min.	STATION #2	3 min.	STATION #3	3 min.

PRODUCTION TIME

9 min./car - 3 stations in line = 1 car/3 mins.
3 min./car = 20 cars/hour

40 hr./week = 800 cars = 40,000 cars/year
60 hr./week = 1,200 cars = 60,000 cars/year

Apply 80% utilization factor

40 hr/week = = **32,000 cars final production rate/year**

60 hr/week = = **48,000 cars final production rate/year**

Allowances #1 and #2 are for future addition of either emission test or other safety inspection procedure

Standards for Inspection

The Department of Transportation has formulated a number of "minimum" motor vehicle safety standards,[11] which apply to the following items: brakes; identification; door latches; hinges and locks; fuel tank; filter pipes and connections; windshield glass and mirrors headlights, head restraints, and seatbelts; anchorage of seats; theft protection; tires; transmission; wheel nuts, discs, and hub caps; and windshield wipers.[12] It has set standards for design and performance that must be adhered to by the manufacturer, and maintained by the vehicle owner.

The United States of America Standards Institute (USASI) has established standards (that conform with Federal Standards) for motor vehicle inspection procedures[13] and station requirements for inspection of motor vehicles.[14] (These standards are sponsored by the American Association of Motor Vehicle Administrators as a minimum requirement to be met.) The standards set forth performance requirements and methods of testing for: steering and suspension; tires, wheels, and rims; exhaust and fuel systems; brakes; lighting and electrical systems; safety equipment including seat belts, fire extinguishers, emergency warning devices, chains, and fender flaps. Under each section, it defines the item to be inspected, and lists the causes for rejection. The Automobile Manufacturers Association has written a similar type of inspection handbook detailing procedure, testing, equipment needed, and causes for rejection.[15]

The USASI standards for PMVI stations prescribe rules and set minimum requirements for the inspection equipment and construction and location of inspection stations. Some of the recommendations are:

1. A single lane station for each 50,000 vehicles registered;

2. Each lane should be at least 18 feet wide and 16 feet high;

3. Natural or artificial ventilation should be adequate to maintain a low carbon monoxide level in the station and to maintain the level of other noxious gases at or below the recommended levels.

It also prescribes minimun inspection equipment and personnel needed. The recommendations made in this report for the most part comply with the standards set by the USASI.[16]

Article IV of the Maryland Automobile Inspection Handbook for Authorized Inspection Stations details the safety standards for motor vehicles, which substantially meet the standards of the USASI. In some cases the Maryland standards exceed the recommended criteria and in other cases they are below the minimum standard.

The Automotive Safety Foundation concluded after a comparison of Maryland's standards with those of the USASI that "where differences exist, the requirements in Maryland are generally higher than those recommended by USASI."[17] Most of the present Maryland inspection requirements would apply to a state-owned and-operated system, except that wheels will not be pulled.

11. Many of the Federal standards are based on Society of Automotive Engineers Recommended Practices.

12. DOT, FHWA, Federal Motor Vehicle Safety Standards and Regulations, with Amendments and Interpretations through Sept. 25, 1969, Sec. II.

13. USASI, USA Standard Inspection Procedures for Motor Vehicles, Trailers, and Semi-trailers Operated on Public Highways, USAS, D7.1-1969.

14. USASI, USA Standard Station Requirements for Inspection of Motor Vehicles, Trailers, and Semi-trailers in Stations Owned and Operated by Regulatory Authority - - USAS D7.2-1968.

15. The Automobile Manufacturer's Association and the American Assoc. of Motor Vehicle Administrators prepare an Inspection Handbook for Passenger Cars and Station Wagons, Trucks, and Buses, Motorcycles, School Buses, Foreign Vehicles, through 1969 models, with manufacturer's recommendations, January, 1969.

16. USASI recommends a maximum of 4 lanes per center based on an output of 50,000 vehicles per lane per year to avoid traffic congestion. Maryland's 6 - and 7 - lane centers have lower annual inspection rate output per lane (32,000) which compensates for increased number of lanes, thus avoiding any congestion problem.

17. Maryland's Highway Safety Needs in PMVI: A Report by the Automotive Safety Foundation, 1969, p. 40.

Program Records

A multiplicity of forms, stickers, records, and reports are needed for the efficient operation of a PMVI center. Highway Safety Program Standard 1,[18] issued by the Federal Highway Administration, requires that every inspection station maintain records specified by the State, and at the minimum include the following information:

1. Class of Vehicle
2. Date of Inspection
3. Make of Vehicle
4. Model Year
5. Vehicle Identification Number
6. Defects by Category
7. Identification of Inspector
8. Mileage or Odometer Reading

It is also recommended that the State publish annual summaries of the records of all inspection stations and that the inspection program be periodically evaluated by the State and the National Highway Traffic Safety Administration.

This information should be stored in such a form that it is readily available and usable by other government agencies. The system should be coupled with the traffic records system required by the Highway Safety Program Standard 10.[19] A comprehensive record-keeping system was recommended by the U.S. Department of Transportation in its report on Safety for Motor Vehicles in Use.[20] The report describes a sophisticated system whereby a potential used car buyer could rapidly be provided with the history of the vehicle he wanted from the time it left the manufacturer until the time of purchase including description of the damage incurred in any accidents, failure to pass inspection, involvement in a defect recall campaign, and prior ownership. This vehicle history would be of substantial benefit to both the consumer and the State MVA.

The present Maryland inspection system maintains records on individual inspection stations but does not summarize this information for the whole State as required by the NHSB standard of record-keeping. Under a state-owned and-operated system, the record keeping function could be more systematic and complete due to the coordination of activities and control.

Inspection Stickers

The District of Columbia Department of Motor Vehicles has tried out a system of notification whereby they mailed postcards to vehicle owners two weeks prior to the inspection deadline. By this method they could regulate the flow of vehicle traffic into the inspection station. They discovered, however, that people were either not receiving the postcard notification or at least claiming they had not. Moreover, because of the high costs of mailing and filing, they decided to abandoned the notification system.

One efficient method of staggering inspection periods is to affix an inspection sticker to the front window orlicenseplate so that it is clearly visible. The sticker states the year, month, and day when the vehicle's current inspection period expires and when he must have the vehicle inspected again. The sticker can easily be identified but not easily altered. The District of Columbia uses a small monthly calendar sticker which has the day punched in it on which the annual inspection is required. For vehicles that have failed inspection, a ten-day or two-week rejection sticker is used. This sticker calls to the attention of law enforcement officials the fact that the vehicle has a defect and encourages the motorist to have his vehicle repaired and reinspected within the alloted time. Vehicle owners with a serious defect that is a safety hazard should be given a 24-hour limit on repairs or not be permitted to drive the vehicle away from the inspection center, depending on the degree of risk involved.

Recall Campaign Information

It would be advisable to include in the PMVI system the information on automobile recall campaigns in order to spot these cars as they go through the PMVI system. The ideal method would be to have the vehicle identification stored in the computer with a description of the defective item and the corrective action. In practice this is not yet feasible since the automobile manufacturers are not required by law to report the vehicle numbers to the National Highway Safety Bureau.

18. Highway Safety Program Standards, June, 1969, PMVI issued June 27, 1967.

19. Each state shall maintain a comprehensive traffic records system containing complete information on drivers, vehicles, accidents, and highways, in a manner that permits rapid retrieval. Standard 10, issued June 27, 1967, FHWA, DOT.

20. U.S. Department of Transportation, June, 1968, pp. 52, 53, 57, 58.

The Bureau does have statistics on number of vehicles recalled by each manufacturer by make, model, year, and type defect, but they have no way of knowing how many of these vehicles are in the State of Maryland.[21]

The D.C. Department of Motor Vehicles, however, is presently working on a pilot project for the National Highway Safety Bureau to check out recalled vehicles in D.C. Working with the Bureau and the automobile manufacturers they have compiled a list of all vehicles involved in recall campaigns. By means of a cathode ray tube at each station, they can instantly check each car as it goes through inspection. (Their system is keyed in by vehicle tag number.) During the four months the program has been in operation, they have spotted 30,745 vehicles that were involved in recall campaigns of which 23% were repaired incorrectly or not at all. The public has reacted very favorably to this service since it serves to inform people who were unaware that their car had been recalled and spot incorrect repairs in other cars.

When the contract was originally signed the idea to set up a date base that cound be exported to other states and used to spot recalled vehicles. At this time the Bureau is unsure what it will do with the system the D.C. Department of Motor Vehicles develops. In any event, the basic data system on recalled vehicles which D.C. develops will be made available to states upon request.

21. Sec. 113 of the National Traffic and Motor Vehicle Safety Act of 1966 requires that every manufacturer of motor vehicles must notify the purchaser (within a reasonable time after a defect is discovered) about any defects in the motor vehicle or motor vehicle equipment. The defect notification must be by certified mail to the first purchaser of the vehicle containing such a defect, and to any subsequent purchaser who presently has the warranty, and also by certified mail or other more expeditious means to the dealer. The notice must clearly describe the defect, explain its possible safety risks and state the measures to be taken to repair it.

PRELIMINARY DESIGN OF MARYLAND REGIONAL CENTERS

The Center Components

To provide flexibility in the design of Maryland regional centers and to allow for the different facility requirements at each location, the preliminary design for the centers uses a system of twelve prototypical components. Each of these components, the facility for inspection, MVA operations, and district courts, is separate and complete. Components offering a range of facility sizes, based on varying numbers of inspection lanes, MVA offices and courtrooms, were designated, as Figure 9.13 indicates. The site area requirements established for each of the components are also set out in that chart.

Component Cost Analysis

Using preliminary design schemes for the twelve components, construction cost estimates, including building and sitework costs, were made. The estimate for each is presented in Figure 9.14; the components are listed across the top of the sheet with the cost for each appearing in the column below.

Component Combinations

The components to be used in each of the regional centers were determined for the inspection systems on the basis of the lane requirements set out in Model 3 and for the Motor Vehicle Administration and the District Courts through consultation with representatives of those agencies. The resulting combinations are shown in Figure 9.15. Fourteen different component combinations occur in the nineteen locations specified under Model 3.

Total Construction Cost Analysis

The construction program calls for the building of a total of 87 inspection lanes, 18 branch MVA offices and 42 courtrooms, plus required ancillary facilities, in nineteen regional state centers. The cost of construction and sitework is estimated to run approximately $25.3 million.

A breakdown of the total cost into the costs of each proposed enter is presented in Figure 9.14.

Furthermore, the construction of the components in the site-sharing combinations of 2 or more, rather than as separate construction projects, results in a savings of 5% to 14% in construction and sitework costs. This savings is due to several factors relating to the economics of larger scale projects and including:

--single site, requiring 1 construction office, 1 supervisor, 1 set of excavating machinery, etc.

--quantity purchase of materials

--elimination of exterior walls in situations where units are linked

--more efficient utilization of manpower

--economics of scale in heating, ventilating and air conditioning systems

Figure 9.14 incorporates this savings by use of an "adjustment factor" which varies according to the nature and size of the construction project. The "adjusted totals" which result from applying this factor appear in the final column and are the basis for the figure derived in Figure 9.15.

Maintenance and Overhead Cost Estimates

In order to estimate the annual costs for operating the regional center complex, a preliminary estimate was made for overhead and maintenance. The building overhead and maintenance cost of $1.10 sq. ft. included cleaning, lighting, operation and repair of heating, air conditioning and ventilation, plumbing, and general expenses (janitorial supplies). The site upkeep costs of $.45/sq. ft. included electrical lighting, relamping, sweeping and cleaning, snow removal, repaving and repair, and maintenance of green area.

FIGURE 9.13 MARYLAND REGIONAL CENTERS - 12 COMPONENTS (figs. sq. ft.)

	Area of Building	Employee Parking	Visitor Parking	Waiting Lanes	Driver Course
INSPECTION FACILITY ALTERNATIVES					
2 lanes	5,280	5,600	-	15,300	-
3 lanes	7,460	7,200	-	19,800	-
4 lanes	9,500	9,600	-	24,300	-
5 lanes	11,200	12,000	-	28,800	-
6 lanes	13,500	13,600	-	33,300	-
7 lanes	14,900	15,200	-	37,800	-
MOTOR VEHICLE ADMINISTRATION ALTERNATIVES					
Small	5,950	*	20,000	-	10,800
Large	11,400	*	50,000	-	21,600
DISTRICT COURT ALTERNATIVES					
1 courtroom	3,450	4,000	16,000	-	-
2 courtrooms	5,200	10,000	32,000		
3 courtrooms	6,900	16,000	48,000		
5 courtrooms	13,800	24,000	80,000		

* included with visitor parking for MVA

FIGURE 9.13

Site Sub-Total	Green Space	Site Total		Symbol
26,180	2,618	23,798	.66A	A
34,460	3,446	37,906	.87A	B
43,400	4,340	47,740	1.09A	C
52,000	5,200	57,200	1.31A	D
60,400	6,040	66,440	1.52A	E
67,900	6,790	74,690	1.71A	F
36,750	3,675	40,425	.93A	G
83,000	8,300	91,300	2.10A	H
23,450	2,345	25,795	.59A	I
47,200	4,720	51,920	1.19A	J
70,900	7,090	77,990	1.79A	K
117,800	11,780	129,580	2.97A	L

FIGURE 9.14 MARYLAND REGIONAL CENTERS - CONSTRUCTION COST ESTIMATE

SCHEMES		Inspection A	B	C	D	E	F	MVA G	H
ACJ	Cost	$306,000						$403,000	
	SF	5,280						5,950	
BG	Cost		$400,000					$403,000	
	SF		7,460					5,950	
BC	Cost		$400,000					$403,000	
	SF		7,460					5,950	
BGJ	Cost		$400,000					$403,000	
	SF		7,460					5,950	
CG	Cost			$493,000				$403,000	
	SF			9,500				5,950	
CGJ	Cost			$493,000				$403,000	
	SF			9,500				5,950	
CHK	Cost			$493,000					$760,000
	SF			9,500					11,400
CJ	Cost			$493,000					
	SF			9,500					
DGI	Cost				$561,000			$403,000	
	SF				11,200			5,950	
DHK	Cost				$561,000				$760,000
	SF				11,200				11,400
EHK	Cost					$652,000			$760,000
	SF					13,500			11,400
EHL	Cost					$652,000			$760,000
	SF					13,500			11,400
FHI	Cost						$720,000		$760,000
	SF						14,900		11,400
FHK	Cost						$720,000		$760,000
	SF						14,900		11,400

Note: Total Cost was adjusted to reflect larger project site by combining separate projects into one since quantity and pricing were developed by separate building units as shown in attached breakdown.

NIE are: A&E Fees, Furniture, Furnishings and Equipment, Project Contingency, Land Cost and Administrative Development Expenses.

Pricing - October 1971

FIGURE 9.14

Courts I	J	K	L	TOTAL	Adjust. Factor	Adjusted Total
	$367,000 5,200			$1,076,000 16,430	93%	$1,000,000
				$ 803,000 13,410	95%	$ 783,000
$238,000 3,450				$1,041,000 16,860	93%	$ 965,000
	$367,000 5,200			$1,170,000 18,610	93%	$1,058,000
$238,000 3,450				$1,134,000 18,590	92%	$1,043,000
	$367,000 5,200			$1,263,000 20,640	92%	$1,162,000
		$506,000 6,900		$1,759,000 27,790	89%	$1,565,000
	$367,000 5,200			$ 860,000 14,690	95%	$ 817,000
$238,000 3,450				$1,202,000 20,600	92%	$1,106,000
		$506,000 6,900		$1,827,000 29,500	89%	$1,626,000
		$506,000 6,900		$1,918,000 31,800	88%	$1,688,000
			$859,000 13,800	$2,271,000 38,700	86%	$1,953,000
$238,000 3,450				$1,718,000 29,750	89%	$1,524,000
		$506,000 6,900		$1,986,000 33,200	88%	$1,748,000

FIGURE 9.15 MARYLAND REGIONAL CENTERS - PROPOSED CENTERS

LOCATION	PERIODIC MOTOR VEHICLE INSPECTION FACILITY						M.V.A. OFFICES		DISTRICT COURT FACILITY				TOTAL COSTS	CENTER SYMBOL
	2 lane	3 lane	4 lane	5 lane	6 lane	7 lane	Small	Large	1 court	2 court	3 court	5 court		
Galena	●						●			●			1,000,000	AGJ
Salisbury		●					●		-	-	-	-	763,000	BG
Easton		●					●		●				968,000	BGI
Cumberland		●					●			●			1,088,000	BGJ
Hagerstown		●					●			●			1,088,000	BGJ
Frederick		●					●			●			1,088,000	BGJ
Aberdeen			●				●		●				1,043,000	CGI
Annapolis			●				●			●			1,162,000	CGJ
Catonsville			●					●			●		1,565,000	CHK
Glen Burnie			●				-	-		●			817,000	CJ
Waldorf				●			●		●				1,106,000	DGI
Baltimore City				●				●			●		1,626,000	BHK
Baltimore City				●				●			●		1,626,000	BHK
Essex					●			●			●		1,688,000	EHK
Timonium					●			●			●		1,688,000	EHK
Rockville					●			●				●	1,953,000	EHL
Silver Spring						●		●	●				1,529,000	FHI
Upper Marlboro						●		●			●		1,748,000	FHK
Hyattsville						●		●			●		1,748,000	FHK
TOTAL	19 inspection facilities 87 lanes						18 branch offices		18 court facilities 42 courtrooms				$25,294,000	

* These figures are taken from Figure 9.14 and include only construction and site work.

GENERAL DESCRIPTION OF MARYLAND REGIONAL CENTERS

Foundation

Concrete wall footings, 6" concrete slab on ground in all areas, except 8" slab for inspection area.

Structure

Concrete structural framing, except over inspection area steel joist roof framing with concrete plank decking.

Exterior Wall and Roofing

Exposed concrete block, aluminum windows and glass fronts, galvanized painted roll-up doors in inspection area. 4-ply roofing on thermal insulation.

Finishes:

Floors

Hardened concrete in inspection area, ceramic tile in toilets, carpeting in court and chambers, all other spaces vinyl asphalt tile.

Ceilings

Exposed planks in inspection area, special ceiling in court area, all other spaces suspended acoustical tile.

Walls

Exposed concrete block walls, painted in inspection lane areas. Drywall furring at exterior walls of office areas. Some wall paneling in court area.

Metal/Wood

Allowances for some counters, shelves, miscellaneous iron.

Equipment

Equipment has not been included, except some check counters in inspection area.

Heating, Ventilation, Air Conditioning

Inspection area heated by unit heaters, all other spaces fully air-conditioned.

Electrical

Fluorescent lighting in all spaces, incandescent lighting in court room area, required receptacles, minimum intercom system, no emergency generator system.

Plumbing

Toilet facilities are required, roof drains, no sprinkler system.

Outside Utilities

Connections to outside utility mains and any snow melting systems are not included.

Sitework

General grading, asphalt pavement for roads and parking area; concrete curbs for waiting line for inspection, asphalt curbs for all other roads and parking spaces.

Landscaping, trees, shrubs, fencing around entire site, required parking and road drainage system, road and parking space lighting, lawn sprinklers.

Demolition work, allowances for bad soil conditions or any work outside of property line, i.e. sidewalks, etc. are not included.

Site grades assumed to be about level.

10

IMPLEMENTATION AND FUNDING

IMPLEMENTATION OF PMVI

Because of the State of Maryland presently inspects only 15% of the vehicle population in privately owned inspection garages, the shift to a State owned and operated system of regional centers to service the entire State will require large capital outlays, large amounts of administrative and clerical work, and considerable public education to the new system. Therefore, in order to provide for a smooth transition into the public inspection system, an implementation plan would be advisable.

There are three approaches to system implementation as set out below:

(1) Implement a full State-wide inspection system the first year employing all permanent centers.

(2) Implement a full State-wide inspection system the first year employing a combination of permanent and mobile facilities.

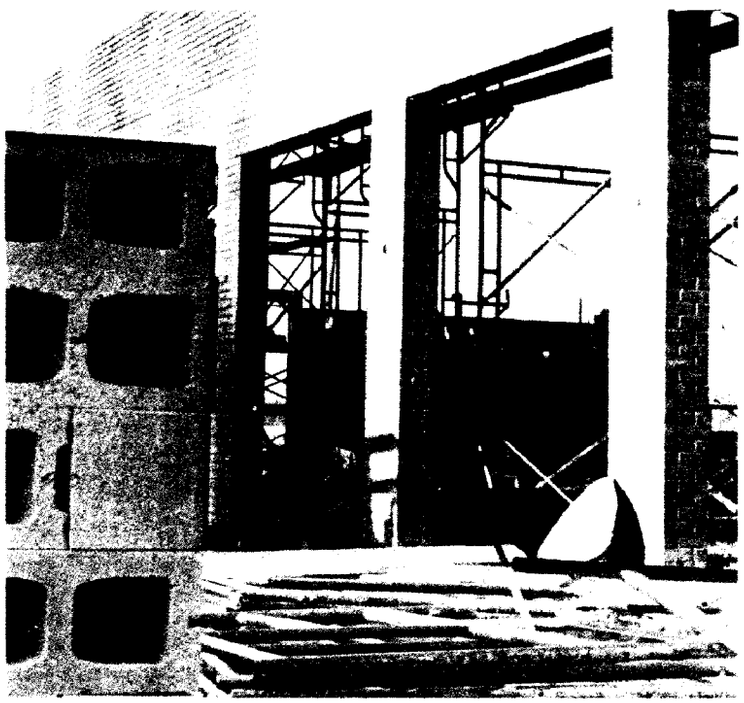
(3) Implement one of the above approaches but vary the inspection requirements by the model or year of vehicles.

The logistical advantage of Approach No. 2 over Approach No. 1 is the reduction in time and costs, both capital and operating, for implementation of the program. The use of mobile inspection units in Approach No. 2 does not require the large capital outlays for land acquisition, buildings, and equipment installations as do permanent stations. Further, the inspection equipment in the mobile units can eventually be installed into a permanent station lane if the need should arise. Both of these first two approaches plan for the inspection of all vehicles the first year.

The third approach embraces a phase-in plan to relieve the burden of initially inspecting all vehicles in the State. For example, the phase-in plan might require that in the first year only vehicles which are more than two years old be inspected, followed by the second year when only the current model year would be exempted from inspection and finally, the third year would require all vehicles to be inspected. In this manner the inspection system will have the opportunity to work out the administrative and management problems before the entire State vehicle population must be inspected in one year.

In a similar manner, a phase-in plan could require the motorist who has received a rejection stricker to return a postcard to the center within a specified time indicating that the defective item has been repaired and re-inspected by the garage mechanic. The mail-in notification would be in lieu of a re-inspection at the center and could alleviate the high percentage of vehicles which would require inspection in the first years of inspection program operation. In practice, the mail-in plan would only be effective for defectives which do not require special equipment for inspection by the mechanic that does the repair.

In order to refine the coordinated operations of a PMVI center, it is recommended that the plans be developed for implementing a prototype PMVI center to serve as a test model. The prototype center could evaluate PMVI procedures and train inspection personnel while inspecting State owned vehicles. This model would afford the State an opportunity to develop smooth operations before implementing the entire system. Further, the prototype model could serve as a job training center for new employment opportunities in Maryland.



Funding of PMVI

A state-wide Periodic Motor Vehicle Inspection program coordinated with the Motor Vehicle Administration and other State functions in regional centers will necessitate substantial capital as mentioned above. The State of Maryland may choose one of two bonding options in order to finance the project--issue consolidated transportation bonds or revenue bonds.

Consolidated transportation bonds can be issued by resolution of the Secretary of the Department of Transportation in Maryland with the prior approval of the Board of Public Works under the new transportation authority of Maryland law, Article 94A. These bonds would probably be limited to a 15-year retirement period by Maryland's constitutional limitations.

Revenue bonds can be issued by the Maryland Transportation Authority without the prior consent of any other department or State body for the purpose of financing the cost of transportation facilities projects. These bonds must be retired within 40 years by specific charges set aside as inspection fees.

The collection of inspection fees to satisfy these bond obligations can be done in one of three ways as follows:

(1) Collection of the inspection fee at the time of inspection;
(2) Collection of the inspection fee at the time when registration and tag fee is paid;
(3) Include inspection fee in the registration fee without identification.

If the first method of collection is used, the inspection fee can be paid either at the last station in the inspection lane or at an exit teller's window outside the inspection lane. The State of Delaware built special facilities for that purpose. However, the disadvantages of numerous burdensome transactions and additional bookkeeping are apparent. This solution does not take advantage of the proposed coordinated systems approach.

On the other hand, an inspection fee could be incorporated into a single payment with the annual registration and tag fee. The inspection fee can be either clearly identified as the cost of inspection or integrated without identification. The latter collection method would stress the integrated systems approach and would allow for a seemingly "free" inspection. However, if revenue bonds are issued to meet the initial capital requirements these bonds must be retired by revenues from specific charges generated from the activity which they established. Therefore, the inspection cost would have to be collected either at the time of inspection or when registration and tag fees are assessed.[1]

If the PMVI system is viewed as part of the total transportation system, perhaps it should be financed by general transportation revenues similar to any port authority or other transportation facility. The safety inspection of motor vehicles would be a service to the citizens of Maryland in the same fashion that improvement of highway safety facilities and other transportation facilities benefits the State.

Finally, the opportunity to secure Federal monies for demonstration grants in utilizing mobile inspection facilities should not be overlooked. These grants would help ease the initial capital requirements. Likewise Federal funds for job training to staff the inspection facilities may be available as discussed in Chapter 9.

Implementation Schedule

The preliminary implementation schedule, Figure 10.1, shows the requisite time elements for the integral phase-in steps. This plan is based on the assumption that the construction of all regional centers, excluding perhaps a prototype, would be started simultaneously in the same year by five or more contractors. Each contractor would be responsible for a group of four or fewer centers. The preliminary implementation schedule reflects the minimum essential time for the completion of each group of centers.

A separate prototype implementation plan is also shown for a single demonstration center which may be undertaken independently for training and evaluation purposes. This prototype center would be funded through other program sources to provide manpower training for the PMVI centers.

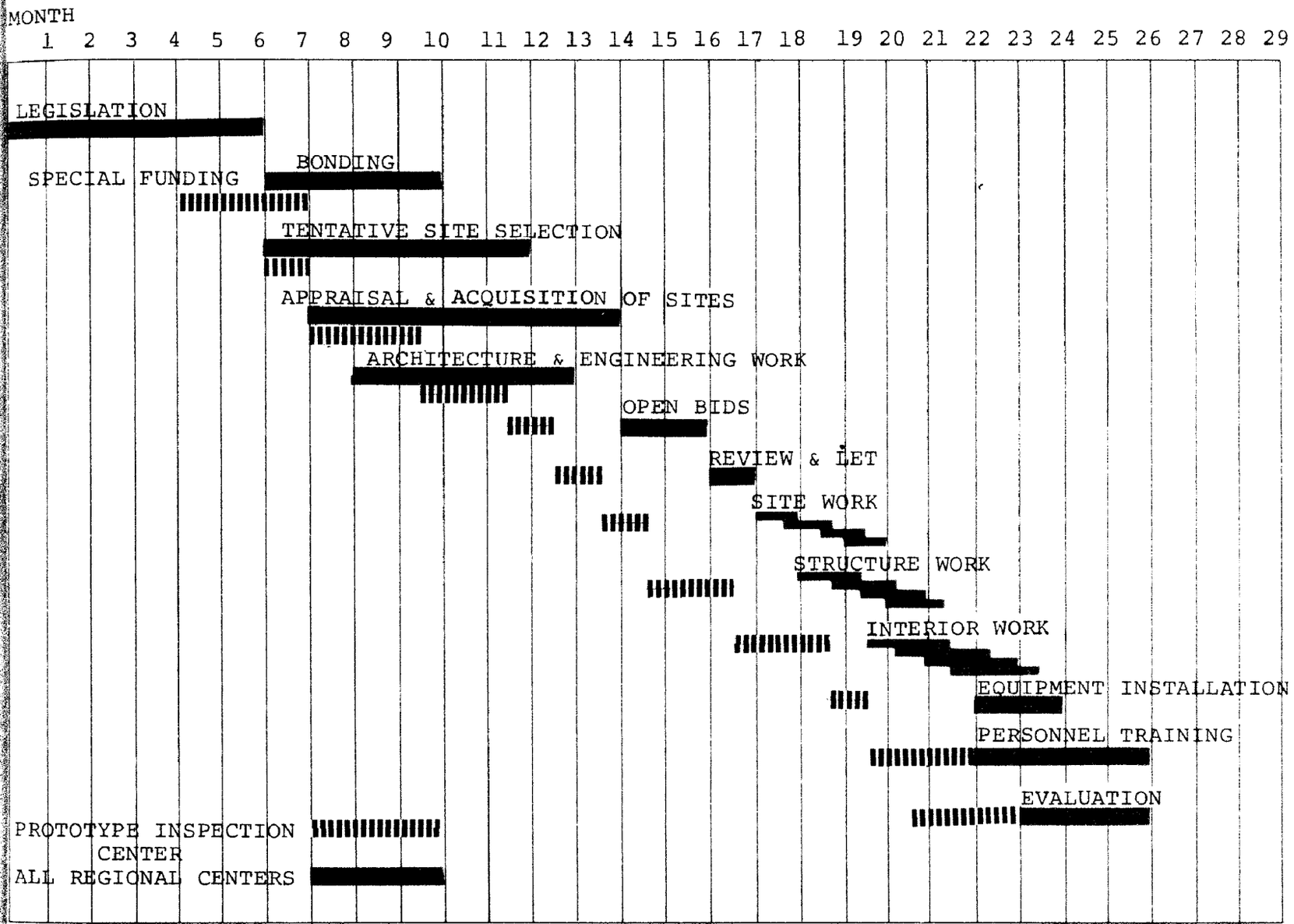
This implementation plan adopted the following time estimates for the construction phase of a single station:

1. Those who use the diagnostic lane will pay a separate fee at the time of inspection which covers the full cost of the diagnostic service.

Site Work	4 weeks	Steelwork erection	
		Exterior walls	
Clearing		Roofing	
Rough grading			
Drainage		Interior work	8 weeks
Foundations			
Blinding of the site		Utility systems	
		Partitioning	
Structure work	6 weeks	Ceilings	
		Plastering and Painting	
Foundations		Floor finishes	
Floor slabs		Sanitary fittings	
		Communication systems	

FIGURE 10.1

PRELIMINARY IMPLEMENTATION SCHEDULE FOR PMVI CENTERS



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